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AMERICAN CINEMATOGRAPHER

A technical and educational publication, espousing progress and art in motion picture photography.

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Vol. X

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Edwin Carewe, producer-director and Robert Kurrle, A.S.C. filming dusk shot for "Evangeline" starring Dolores Del Rio

". . . . half the task was done when the sun went down, and the twilight Deepened and darkened around; and in the haste the refluent ocean Fled away from the shore and left the line on the sand beach, Covered with waifs of the tide, with kelp and slippery sea weed . . . ."

New Silent High-Speed Intermittent Mechanism for B. & H. Camera

Detailed Explanation of New Movement as Presented Before the S. M. P. E. at that Society's Spring Meeting in New York City, May 6 to 9, 1929.

By A. S. Howell and Joseph A. Dubray

In the March issue of the American Cinematographer a detailed explanation was printed of the silencing of the Bell & Howell camera for sound work. The paper by Mr Howell and Mr Dubray as presented at the S M. P. E. meeting consisted of two parts. The first part dealt with the silencing of the camera. The second part explained the new high-speed intermittent movement As the silencing has already been explained in the March issue, we are now only printing the second part of the paper dealing with the new high-speed movement. According to advice from the Bell & Howell organization, this new high-speed movement, while perfected, will not be ready for distribution before approximately another six weeks. However, as this issue goes to press no definite date on which distribution will start has been announced

THE intermittent mechanism of a motion picture camera is, so to speak, the heart of the whole instrument, since upon it depends the precise registering of the rapidly succeeding photographic records.

The intermittence of movement has from the very beginning of motion pictures, put to task the inventive genius of motion pictures Engineers, in order to solve the problems involved in the designing of a mechanism which would, while working at a speed of 16 pictures per second, perform a cycle of four main and distinct movements.

I:—The engaging of the film-feeding fingers into the film perforation.

II:—A downward movement of the fingers to bring an unexposed portion of the film in the proper position in front of the camera aperture.

III:—A backward movement to withdraw the fingers from the film perforations.

IV:—An upward movement of the fingers to bring them in position to re-engage into the film perforation and repeat the cycle.

During this cycle of movements, the shutter of the camera was to make one complete revolution.

The mechanical problems inherent to this rather complex cycle of movements had been happily solved with a reasonable disregard of the noises resulting from the functioning of its parts, all attention being paid to the accuracy of registration and the elimination of any possibility of damaging the surface or the perforations of the film.

In due course of time, intermittent movements were developed which permitted a considerable increase in the photographing speed, that is to say, in a considerable increase of the number of frames which could be exposed each second.

A paper introducing such a mechanism capable of performing as high as 200 cycles per second was presented at the Spring Convention of 1923 to this Society.

Again, the noises inherent to this mechanism were, to some extent, disregarded.

The advent of sound motion pictures demanded a mechanism capable of noiselessly completing at least 24 cycles per second and also capable of withstanding a much more strenuous usage than the movements in existence, due to the fact that the average length of scenes taken for sound purposes is at least four to six times greater than the average length of scenes photographed for the silent drama.

At the same time that the feverish demand for camera equipment suitable for sound work brought about the silencing of existing mechanisms, the camera engineers did not consider this adaptation as quite sufficient for the needs of the new industry and the designing of a new mechanism was deemed highly desirable.

The main prerequisites of such mechanism are the absence of noise and the ability of performing at a minimum speed of 24 pictures per second (90 feet per minute), while conserving intact the indispensable attributes of perfect registration, forward and backward movement and an as complete as possible elimination of friction upon the surfaces of the film, in order to avoid the evils of scratches and abrasions.

The mechanism being described in this paper is the latest contribution of the Bell & Howell Company to the Motion Pictures Industry.

In order to simplify its description, we shall consider one after another its principal parts, namely:

The Film Channel.

The Film-feeding Fingers.

The Registration Fingers,

and conclude with a brief description of features of general interest, such as the lubricating system and the general assembly of the mechanism.

THE FILM CHANNEL:—The film channel can be divided into three main sections, an upper and a lower curved section, each having a radius of 1¼ inch and a central plane section.

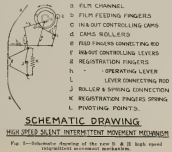


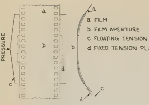
Fig 5—Schematic drawing of the new B & H high speed intermittent movement mechanism.

Figure 5 shows a schematic drawing of the mechanism, plainly illustrating the above mentioned essentials, Film Channel, Film-feeding Fingers and Registration Fingers.

The Film-feeding Fingers operate in the upper curved section, while the plane section comprises the camera aperture and the location of the Registration Fingers.

The central plane section of the Film Channel has been kept within the shortest possible length in order to insure perfect flatness of the film surface at the time of exposure.

The longitudinal curves impressed upon the film by the curved sections of the channel, in conjunction with the transverse guide and ten-



FILM TENSION IN SILENT HIGH-SPEED INTERMITTENT MOVEMENT FILM MECHANISM

Fig 6—Film tension in the new B & H speed intermittent movement mechanism

sion plates, precent any possibility of the film sagging or curling, even under very severe temperature conditions.

The film is thus kept under control througout its path in the channel, and the presentation of a perfectly flat film surface at the focal plane of the photographic lens is thus assured.

The Film Channel consists of two members. The film is inserted in the space thus provided for and which is so designed as to provide a frictionless surface passage of the film through it.

A light spring pressure of the pareture plate against the body of the movement prevents possible injury to the film or to the mechanism, should be threaded improperly.

The aperture plate is provided with a lock and the film cannot be introduced into the channel if the lock is not in its engaged position. This arrangement eliminates all possibilities of neglecting to lock the aperture when the mechanism is replaced in the camera after having been withdrawn from it for the purpose of cleaning, even if this operation is performed under the greatest possible pressure of urgency.

A very light tension at one side of the film keeps it registered sidewise against a solid rail.

Figure 6 shows the arrangement of such tension, which is exerted only on the portions of the film which assume the curved shape of the film channel.

The point on the floating tension plate at which the pressure is applied was determined by careful calculation, and is so located as to assure an equally distributed pressure along the entire side tension-producing surfaces.

THE FILM-FEEDING FINGERS:—The function of the Film-feeding Fingers is to engage in the perforations, carry the film downward or upward, according if it is desired to record the motion of the subject normally or reversed, to withdraw from the performations and resume its original position as at the beginning of the stroke.

The ideal IN and OUT movement of the Film-feeding Fingers would be the one in which the motion occurs at a time when there is no contact between the fingers and the faces of the perforations, since the inevitable wear which occurs at the end of the fingers, is caused by the rubbing of the surfaces which contact with the faces of the perforation.

In the new mechanism here presented, the entire feed forward movement of the fingers has been held to only .012 inch and only 1/6 of this total displacement, or .002 inch, is the extremely short motion which takes place from the time at which the fingers begin to engage in the perforations until the entire IN movement is completed.

In Figure 7 curve "A" represents the acceleration due to a constant force, that is to say, GRAVITY. Curve "B" is plotted from the downward movement of the film.

It will be noticed that during a complete from top to bottom stroke, the acceleration and deceleration of the feeding fingers lie very close to the ideal. The variation is very slightly greater in the deceleration.

It is because the ideal acceleration condition is so closely met that the time necessary for the IN and OUT movement of the feeding fingers has been reduced to the smallest extent.

The amount of noise produced in intermittent movements by the rapping of the Film-feeding Fingers against a stationary film, is determined by the amount of "play" between finger and perforation.

In the movement here presented, the Film-feeding Fingers are .008 inch narrower than the film perforation, which condition limits the overthrow to .004 inch, that is to say, the Film-feeding Fingers move along a path only .004 inch long before touching the faces of the perforation.

The extent of displacement is so small that the downward movement of the fingers is extremely slow at this moment, so that they may practically be considered as stationary at the instant in which they actually come into contact with the film perforation.

To insure a still greater resistance to wear, the ends of the Film-feeding Fingers are chrominum plated.

In Figure 8 are shown five schematic drawings of the mechanism, at five different phases of movement.

It is well to remark that the schematic condition of the drawings does not permit to illustrate the extremely small overthrow previously referred to.

In position 1, the Film-Feeding Fingers are withdrawn from the perforations and the Registration Fingers are holding the film stationary by spring pressure.

In position 2, the Film-feeding Fingers are shown during their upward motion. The film is still held in position by the Registration Fingers and remains so while

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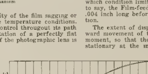

a. ACCELERATION BY A CONSTANT FORCE (GRAVITY)
b .. .. OBTAINED BY THE MOVEMENT

Fig 7—Comparative curves of the acceleration by a constant force with the acceleration obtained through the movement.

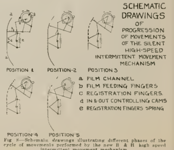

Fig 8—Schematic drawings illustrating different phases of the cycle of movements performed by the new B & H high speed intermittent movement mechanism

Lighting the Big Shots in Chicago

The Opening of the World's Largest Sports Arena Presents Some Unusual Lighting Problems

By R. J. Duggan
Managing Director, Ambassador Film Company

[When the ordinary motion picture house patron sits back and watches a few feet of some big news event flash on the screen he little realizes the difficulties that often have been faced to provide the picture. The following article tells of the problems in lighting Harmon's Stadium in Chicago for the opening.—Editor's Note.]

IF "PADDY" HARMON had built his stadium in Hollywood or New York City instead of in the middle of the United States the demand of the newsreel men for the amount of light necessary would have been an easy request to meet. A dozen or more Sun Light Arcs is every day conversation for the men of the East or West Coast production centers where this amount of equipment is readily obtainable. In Chicago, however, a dozen Sun Light Arcs would lay in the warehouse for that many years unless some producer decides to make an outdoor gangwar picture with accurate local color.

As the making of big interior shots in the Chicago territory is the exception rather than the rule, it would be an investment of questionable soundness for anyone to tie up a lot of money in lighting equipment which would require the entire time and attention of one man to keep the rats from building nests in the rheostats. But in spite of the old law of supply and demand, sufficient capital has been interested in the future outlook of the Middle West lighting system, to enable firm, steady strides to be made toward perfection in this direction. In its entirety, the larger and more powerful equipment of Chicago is used but once or twice a year, and due to these long periods of idleness complete reconditioning is often necessary. In fact, rebuilding and remodeling the lamps to adapt them to the requirements of just one job is not an unusual thing. Another perplexing problem is the lack of proper current supply. Alternating current, in most cases, is the only thing available and generators are an expensive proposition when they are run only a few times a year.

A great deal of the lighting in the Chicago area is for Newsreel photography exclusively, and provision for proper placement of the lamps is seldom made. Conditions often require that scaffolding be built for a single shot. This means nothing in the life of the studio electrician, but it never fails to elect a yell of protest from the small producer or newsreel men who are paying for the lighting. On the rare occasions when elevations are provided, it is about as simple a job as building the pyramids. The winches, hoists, and block and tackle of the studio are supplanted entirely by plain and fancy elbow grease.

On this particular job, the new Chicago Stadium, nearly every possible problem known to lighting was presented. This Stadium is an enormous building about 350 feet long by 250 feet wide with a 150 foot ceiling. The arena seats 26,000 people and the seats, which are painted red, extend nearly to the roof. The ring for the Loughran-Walker fight was well illuminated with 54 1000-Watt lamps hanging from above the ring. Lighting the Stadium itself for crowd shots was a different proposition.

The equipment used was as follows:

Four 24-inch Mirror Searchlights, two 23-inch Search-

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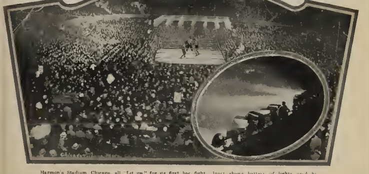


Harmon's Stadium, Chicago, all "Lit up," for its first big fight. Inset shows battery of lights used by Ambassador Film Company

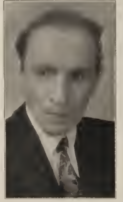
A. S. C. Plans Announced

Class Lines Wiped Out—Membership Limited—Fellowships Planned, and Banner Year Predicted by President Seitz

NEVER in the history of the American Society of Cinematographers has the outlook been so bright as at the present.

This is the opinion of John F. Seitz, who recently succeeded John W. Boyle as President of the Society, and who is planning the greatest year the organization has ever known. Mr. Seitz, one of the profession's finest cinematographers, is short on words and long on deeds, so when he speaks one cannot afford to turn away. And his plans for the Society for the coming year indicate activity that will make it a still more commanding force in the cinematographic world.

His first move on taking office was to wipe out the lines of class distinction within the organization. For some time the membership has been separated into classes listed as First Cinematographers, Second Cinematographers, Special Process and Trick Cinematographers, Akeley, News, and still photographers. But these lines of distinction have now been eliminated and henceforth all members are classed simply as "members," with equal rights and responsibilities.



John F. Seitz

Mr. Seitz's second move was to limit the membership. This was done at the meeting on May the twenty-seventh, and the limit was set at 150 active, resident members, no limit being set for non-resident members.

And now Mr. Seitz gives us some more of his plans for the coming year:

"The American Society of Cinematographers is a social and educational body," declares Mr Seitz, "devoted entirely to the study, practice and advancement of the art and science of cinematography. It is our object to direct all of our efforts to increasing the prestige of the cinematographer in the motion picture industry on the part of this Society.

"While friendly to all other organizations within the motion picture industry, we are not affiliated with any other body, and to properly function as a unique Society devoted to cinematography, we must and will retain this independence.

"During the present year open meetings will not be held at regular intervals, but only at such times as we can arrange for special programs that will be of general interest and of real benefit to all the members. At these meetings papers will be read relating to the business and technique of cinematography. Most of these will be prepared by our members themselves.

"Another great step which is planned is the publishing of a yearbook by the Society. This book is to contain a wealth of cinematographic data for the cinematographer, professional and amateur, the director, producer, exhibitor, engineer and all others engaged in or interested in motion pictures. This book will probably be published next March. But there will be more about that later."

At this point Mr. Seitz announces another plan that should prove to be one of the most forward steps the organization has ever taken.

"We propose during this year" says Mr. Seitz, "to inaugurate a system of conferring Fellowships in this Society upon those members making the greatest or most significant contributions to the art or science of cinematography. This degree, which can only be earned by hard and inspired work, in addition to being a mark of real distinction, will carry with it some suitable award from the Society. Details of this plan will be announced later.

"On the whole, the prospects for this Society never before have been so bright as at present. Never before has the way been so clear for the A. S. C. to step out ahead of this fast changing and progressive business and light the way for all others to follow as we prove ourselves a real force for good for the cinematographer and the entire motion picture industry."

The S. M. P. E. Convention as Seen by Our Technical Editor

Joseph Dubray Gives An Intimate and Chatty Account of the Convention Held in New York from May 6th to 9th.

[Our Technical Editor decided that a letter would be the best report of the Convention. After reading it we decided he was correct.—The Editor.]

Dear Hal,

Chicago, Ill., May 13, 1929.

Just back in Chicago from the "Big Village," and I can't resist the temptation of pounding on my typewriter for your benefit and the benefit of the A.S.C. a little story on the S.M.P.E. Spring Convention.

After a very pleasant journey through the Spring beauty of the Pennsylvania hills, I reached the Metropolis and the hotel safely, in spite of the numerous dodgings of my cab through the afternoon traffic of Broadway and Seventh Avenue.

A very pleasant surprise awaited me there, and that was the discovery that George Schneidermann was stopping at the Park Central, which was to be the scene of the Convention. With him was Tappenback and some of the Fox experts, who were busy arranging things for their departure for Europe in the next few days. Another surprise, and a pleasant one, was when I bumped suddenly and unexpectedly into Joe August, who was there waiting for another Fox Company, which finally showed up a few days later.

Going through the register of the Hotel, I discovered, with delight, that Mr Richardson, of Mole-Richardson, and Mr. Rackett, of the Producers' Association, were going to represent Hollywood at the Convention.

Germany was to be there in the person of Dr. Petersen, of Agfa, and England was represented by Mr. Rowson, the Chairman of the London section of the S.M.P.E.

And so, at 10:00 A. M., on Monday, May 6th, with Engineering exactitude, the Convention was opened by President L. C. Porter.

If you want to know exactly what was done during the four days that the Convention lasted I cannot offer a better suggestion than for you to attentively peruse the Program, which has been followed quite faithfully. The forenoon of Monday was dedicated to reports of the different committees, and I know that you can visualize J. I. Crabtree reading the achievements of the Motion Picture Industry during the last semester, and Major Edw. J. Bowes saying a few words to us with his marvelous radio voice.

In the afternoon your servant bored the Assembly by reading something about the Bell & Howell motion picture camera in sound pictures and the new silent high-speed movement. Oscar DePue of Chicago presented an interesting printing machine; F. D. Woodward talked about patent matters, and finally the stentorian voice of F. H. Richardson definitely settled the question of better projection.

In the evening, after a very congenial dinner, we attended the showing of "Alibi" on the Park Central Hotel Roof. They were practically all there—L. A. Jones, of Eastman: our friend, Herford Cowling; Dr. Sease, Dr. Mees, Mr. Rayton, of Bausch & Lomb; Richardson and Rackett, of Hollywood; Coffman, of New York; Dr. MacKenzie, Mr. Elger, of General Electric; Cameron, the Publisher, writer and engineer; Benford, of Schenectady, and many, many others whom I should mention, but space and memory fail.

On Tuesday morning we were conveyed by busses, autos, taxis, etc., etc., to the Bell Telephone Laboratories. L. A. Jones entertained us with an extremely interesting paper on Tinted Film for sound positive, which sounded more like an entertaining, psychological study on the reaction created in the human mind by color than a scientific paper presented to a conclave of engineers. Messrs. Blattner, L. A. Elmer and H. Pfauneustiebl, all of the Bell Telephone Laboratories, put our brains to severe gymnastics by presenting a long series of diagrams, curves, photographs and mathematical expressions—enough to make you feel like getting by yourself in some secluded spot and absorb, absorb and absorb. K. F. Morgan, of Hollywood, followed with a truly inspiring description of the marvelous achievements attained in re-recording. His paper was entitled "Technical Problems Encountered in Re-recording," but his demonstration proved that these problems were solved with extremely gratifying results.

Mr. J. B. Irwin closed the Session and off to lunch.

In the afternoon Hollywood came to the fore, and Mr. Rackett read the Carroll Dunning paper, which was cause of many amusing comments and a sincere expression of admiration for the marvelous work the Dunnings have conducted in the past few years. Our friend, Richardson, talked about and presented on the screen the Universal Camera crane—a great boost to the Universal Studio engineers and to Hal Mohr.

The "Clou" of the afternoon was a television demonstration. Dr. H. E. Ives walked to the Speaker's Platform amid thundering applause. The demonstration given by him was as fascinating as it was instructive. After a brief description of the system, illustrated by lantern slides showing the apparatuses, the actual demonstration took place; the sending apparatuses being at one end of the large hall and the receiving apparatuses at the other extreme end. No matter how accustomed one is to witnessing **scientific miracles**, one cannot but feel his heart beating a little faster when he actually sees on the red, glowing screen the picture of the person who is talking at the other end of the wire. And, believe me, Hal, my heart beat just as fast when a young man was talking to us as when the lovely features of a lady assistant to Dr. Ives flashed her pretty smile on the screen and charmed our ear with her voice.

Since no program was scheduled for the evening, I just ran over to 42nd Street, the headquarters of the New York Cinematographers International. It was a meeting night and I was received extremely cordially by the 150-odd members present. I spent a very interesting evening with them, and "so to bed."

Wednesday morning found me on my way to the R.C.A. Photophone projection room. Mr. John Klenke, of the Visual Instruction Section of General Electric, gave a very interesting screen demonstration in which notes struck on the piano would show the photographic record of their sound on the screen at the same time as the note was played. I am ashamed to confess that I do not recall offhand the name of the master at the piano, but I indeed enjoyed the whole demonstration, both technically and artistically.

John B. Taylor, also General Electric, gave us a very remarkable talk and demonstration on "The Needle of the Optical Phonograph." I think that this title is extremely fitting to the description of the optical system of G. E. recording apparatuses. Mr. Taylor demonstrated

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Some Problems Related to Composite Photography

A Paper Presented at the New York Meeting of the S. M. P. E., May 7, 1929

By Carroll Dunning

Dunning Process Company, Hollywood, California

So much is written about the screen stars and their exploits that the picture fans rarely hear about the men who are responsible for many of the most thrilling, artistic, and sensational scenes in pictures. These men are the highly trained cinematographers who in miniature and special process photography make possible the picturisation of scenes that could never be made in any other way. They are unsung heroes of the film world and this article will give some idea of what service they perform.—Editor's Note

ONE of the early motion picture spectacles was created by buying two old locomotives and having them crash together in a head-on collision. The engineers had pulled open the throttles and jumped prior to the impact. A couple of empty engines hitting each other will not suffice today. The human element must be included in the shot. You must appear to maim at least one engineer and strew the track with the injured or the option on your employment contract will not be renewed.

The present scenario specifies thrills too dangerous for even stunt men to attempt, and the exhibitor insists upon "big situations," too costly for the most extravagant producer to pay for.

The trick photographer was born and filled the niche for a time with split mats, double printing, etc. But a wise public soon became critical and demanded realism. This necessity has created in Hollywood a small group of men who are outstanding in their versatility and resourcefulness. Some are under contract with the large studios, others are free lancing. Problems are presented to them at a moment's notice, which require an adequate understanding of mechanical, electrical and illuminating engineering, a proper appreciation of art and a due regard for dramatic values. The misnomer, "trick men," still sticks but they are the really "special effect" technicians of the industry.

Of the hundreds of nuts they are called upon to crack, I will present a few.

Scene No. 342 in a recent aviation picture called for a semi-close-up of a prominent actress flying above the ocean wastes (there must be no vessels or land in sight). She could not fly and refused to go as a passenger. The shot across the plane was too close to use a double. A studio technician, who is also an aviator, filmed the ocean minus the plane from a five-hundred-foot elevation and incidentally went about ten miles off shore in a land plane because he knew he would get a better cross lighting effect. From his ocean negative a balanced transparency was made, and through the latter the actress and aeroplane was "doubled in" at the studio. Of course all of the movement of the original aeroplane in its ever-changing relation to the ocean beneath was imparted to the "doubled in" shot, even though the actress emoted in a perfectly stationary plane sitting on the stage floor.

Scene 128 in another picture called for a love scene on the stern of a pleasure yacht in mid-ocean, with dialogue between star and hero, and a love song by said hero. The silent version had been shot some weeks previously on a chartered boat rented at $400 a day, and the owner had sensibly refused an attempt to load a five-ton sound recording truck on his private yacht. So, 300 feet of ocean was photographed from the Catalina excursion steamer and doubled in with a balanced transparency as described in the preceding example. The yacht stern consisted of eight square feet of floor boarding, a railing, wicker seat and a flag pole. The sound of the side-wash of the water was picked up by hanging a microphone over a water-filled hox through which a workman swished a wooden paddle. A second "mike" picked up the dialogue and song while a third recorded the orchestral accompaniment of an Hawaiian orchestra, supposedly amidship of our nailed-to-the-floor yacht. The composite photography was completed instantaneously and simultaneously with the recording of dialogue, song, music and sound effects. The result on the screen was startlingly realistic.

Scene 321 specified the explosion of a gasoline tank under the cowl of an auto, enveloping the agonized driver in flames. In the first tests it was found that gasoline burned so violently that it left no unexposed silver in the negative on which to photograph the double-exposed driver. Finally, by blowing an ignited alcohol vapor across a container filled with a mixture of potassium chlorate and powdered sulphur, the flame retained its transparent character to its full height, because the liberated oxygen and the potassium kept the flame tongues more or less a thin blue to their extremities.

Scene 19 required a miniature dam to be blown up by the villain and the released water to rush almost into the lens of the camera. A week was spent in constructing the dam and when the dynamite cap burst the walls, a gob of mud plastered itself on the camera lens. The resultant negative looked like a microphoto of a magnified polyp. The dam bad to be rebuilt and reshot.

A short time ago, a producer considered the advisability of sending a picture company to Italy. The dramatic portions of the story were night scenes along the Venetian waterways. To give the feature what is known as "big production value," it was necessary to open with an establishing shot showing the principals in an actual gondola passing through the Grand Canal. The electrical department immediately tabooed such a plan for they knew there were not enough lights in all Europe to illuminate Venice from the Rialto Bridge to the Lido ferry. The technical supervisor solved the problem by building an exact replica in miniature on a scale of one inch to the foot.

Even the smallest detail was carried out down to the little wired and lighted electroliers in the Plaza of Santa Maria. The church itself was a work of art. When finished, the floor of the stage was flooded with water to a depth of eight inches covering about an acre in area, and Venice stood complete and realistic. A motor-driven camera, with lens six inches from the water's surface, was mounted on a board and floated through the canals, photographing the panoramic scene as it moved along. Into this scene was doubled a semi-closeup of the two principals seated in a full size gondola. The realism of the resultant composite photograph, which also showed the rowing gondolier on the stern, would never be questioned by any audience.

Relativity is an important factor in all miniature work. If the scale representing an English countryside traversed by a railroad is built one inch to the foot, it is a simple matter to construct the railroad station and the farm houses of the correct size, but regular straw is too large to represent roof thatching. Perhaps the strands

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New Silent High-Speed Intermittent Mechanism for B. & H. Camera

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the shutter (not shown in the drawing) is functioning in the exposure condition.

In position 3, the Film-feeding Fingers have reached the end of their upward stroke and are advancing into the perforations. The Registration Fingers are still engaged

In position 4, the Film-feeding Fingers have moved forward slightly and the Registration Fingers are withdrawing. This phase of the movement is difficult to illustrate in proper proportions since it involves the simultaneous motion of feeding and Registration Fingers, which covers distances but a few thousandths of an inch long.

In position 5, the Film-feeding Fingers are carrying the film downward and the Registration Fingers are in their retracted position.

The IN and OUT movement of the fingers is accomplished by means of two adjoining cams which are integral parts of the crank shaft. These cams provide positive forward and backward movement to the fingers and eliminate the use of springs.

No damage can possibly result from undue friction or strain upon the film perforations.

The motion producing surface of each cam subtend an angle of 12 degrees which is but 1/30 of its periphery. There is no load upon the inactive parts of the cams.

The cam's rollers are freely fitted in their sockets, they creep around very slowly while in contact with the active zone of the cam, and each point of their surface incurs an equal amount of wear. They can easily be removed and replaced in their sockets without the use of tools should the inevitable wear produce any loose motion.

The lubrication of the cams and rollers is assured by oil saturated felts which are in constant contact with the periphery of the cams.

The exposure condition is met by this new mechanism as in the usual 170 degree shutter cameras

THE REGISTRATION FINGERS.—In order to insure the perfect registration of each photographic image on the film and to insure that there will be no motion in the film during the time of exposure, two pairs of Registration Fingers have been provided in this mechanism.

These fingers engage the perforations at the end of the film-feeding stroke, become stationary when fully engaged and remain so until the beginning of the following stroke.

The manner in which these fingers seize the film is entirely new.

At the moment at which they have fully completed their forward movement they become wedged against the faces of the film perforations by spring pressure. The film itself serves as a stop for the fingers, and the spring pressure locks both fingers and film, assuring absolute rigidty and perfect registration

The Registration Fingers are also chromium plated in order to insure their longest possible life

PIVOTS AND BEARINGS.—There are only three points in the mechanism where bearings are used

The pivot bearings are adjustable and very generously calculated so that the perfect functioning of the movement is assured throughout its life

LUBRICATION.—The cams and rollers are lubricated, as previously explained, by felt wicks, and the same system is used for the constant lubrication of the other rapidly moving surfaces. Oil holes are provided for the proper lubrication of the other parts of the mechanism.

GENERALITIES.—The movement proper is built around a single piece of hardened steel.

All holes which are to receive pivots and bearings are bored after hardening, with tolerances of .0001 inch

The movement is entirely enclosed in an aluminum cap, which serves the threefold purpose of rendering the mechanism light-proof, of preventing the spattering of the lubricating material within the camera and on the film when the movement is working at full speed, and as a protection against dirt from outside sources.

Provisions have been made for the mounting of a total reflection prism in the aluminum cap of the mechanism, so that a direct focusing magnifying optical system can be mounted on the camera

The installation of this new mechanism in the Bell & Howell camera is extremely simple and requires, as the old movement, only to be slipped in the proper position and fastened there by two clamps.

No alterations of the camera are necessary, except for the main cam, in which a worm has to be mounted to drive the mechanism itself and for a hole to be bored in the inner frame of the camera in order to provide space for a gear which is driven by the worm.

The whole mechanism which, as it has been seen, is built upon very simple lines, is remarkably small in size and presents at the same time all the necessary requisites of remarkable sturdiness and endurance.

An extremely careful adjustment of all its parts insures a most perfect functioning as well as a total absence of the noises which are so detrimental to the making of sound and talking pictures.

Projectionist Makes Good as Manufacturer

It was away back in 1919 that a motion picture projectionist, working in a Los Angeles theatre, conceived the notion that a speed indicator would be a fine thing to use in working out the musical score for a picture

The more he thought about it the more convinced he became that he would be able to put his thought into practical operation; so he invented such a contrivance and F. A. Miller backed him up in his idea by taking the first one and Elinor, whose orchestrations for big pictures have made him famous, used it at the California theatre in writing his musical score for a picture. And that was the start for this young man

He is M. M. Moon, head of the Moon Film Speed Indicator Company, 222 S. Hamel Drive, Beverly Hills, California.

Working out that first machine gave Moon many a headache, but was finally settled by means of a dream and a breadboard. It seems that a special adjuster gave him a lot of trouble. At times he despaired of ever getting it right. Then he had his dream one night, or rather in the wee small hours of the morning. He jumped out of bed, ran to the kitchen and getting paper and the bread board, dashed back to bed where he drew his plans which worked out to complete satisfaction

Since then Moon has conceived and put on the market many other devices. They include a silent auto-rewind machine and a film mending machine that does away with many lost motions, various types of speed indicator measuring machines, a measuring machine for film for cutting room use; wall type speed indicators for projection room use, a speed indicator for use on cameras while filming, and other devices.

Throughout all his work he has carried the thought of making his devices to withstand any and all conditions. For example, the speed indicator for camera work has gone to all parts of the world under all conditions. Clyde De Vinna, M-G-M cameraman, took one on two trips to the South Seas, and at present is far in the interior of the African jungle with one on his Bell and Howell camera.

His devices are used by such concerns as First National, M-G-M, Paramount, Hal Roach, Harold Lloyd. Charles Chaplin, Pickford-Fairbanks, Mack Sennett, R. K. O., Warner Brothers, DeMille, Fox, Educational and Christie, to say nothing of many of the largest theatres and theatre chains in the country. Abroad they are being used universally.

"No one can guess the speed accurately," says Moon, "so why try to guess when you can have a little machine do the work for you without a mistake?"

Limitations of the Iron Ear

A Few Pertinent Suggestions On How To Get Better Results with Present Sound Equipment in Use in the Motion Picture Studios.

By Carl Rhodehamel

The writer of this article was formerly with the General Electric Company and has had years of experience in the use of the modern condenser microphone. He has recently perfected a unique system of sound recording with a quick playback feature, for his own use in the training of voices for microphones. His views here expressed are presented solely as his own opinions Editor's Note


Carl Rhodehamel

No man is better qualified than the cinematographer to understand the natural limitations of a piece of equipment.

One of the important parts of his mechanism has three good legs—but nevertheless it is unreasonable for him to expect it to walk from place to place. Neither does he depend upon his camera to say "Come closer; I cannot see you clearly."

Now that the iron ear has appeared on the lot as a collaborator with the glass eye, it is apropos to point out again that the "mike," too, has its limitations.

Even though the condenser microphone is the listening outpost of the whole sound system, it cannot be expected to hold up a mechanical hand every now and then and exclaim, "Not so loud, brother, I'm not deaf!"

Briefly, then, what are the limitations of the iron ear? What can the user of sound equipment expect from the microphone, the amplifier, recording machine, and reproducer?

Those who have made a careful survey of present sound equipment from the standpoint of how to use it more efficiently, are agreed that five basic limitations should be considered.

1. Sounds must not be too loud nor too soft.
2. Sounds must be produced within the limited critical area of the iron ear—the microphone.
3. Sounds must not be too low nor too high in pitch.
4. Allowance must be made for the fact that all sounds within the critical area will be picked up by a microphone.
5. The microphone is an extremely sensitive instrument, and should never be touched except by the technical operator familiar with its particular characteristics.

Just what is meant when we say, "Sound must not be too loud nor too soft." Cinematographers will appreciate the difference between "too little" or "too much" light. The conditions are somewhat analogous. When sound is too soft the fixed inherent noises in the equipment will claim undue attention to the listener. When sound is too loud it will overload the equipment and result in "blasting," "cutting through," etc., depending on the type of recording machine. The range, therefore, between "soft" and "loud" is very narrow, less by far than the normal human ear.

This limitation of sound equipment is particularly apparent in recording music. When an orchestra plays normally, the conductor using wide extremes of volume, pianissimo and fortissimo, to get effects, it is necessary for the technical operator of the sound equipment to turn a dial and "bring up" the pianissimo and "cut down" the fortissimo, in order to bring the music within the scope of the apparatus. Of course, this spoils the music from the conductor's point of view, but saves it from the technical operator's point of view.

Therefore, wouldn't it have been more reasonable for the musician to have kept his volumes within the capabilities of the equipment in the first place? The writer is a musician, with several years' experience as an orchestral conductor, and realizes that it can be done. But how—that is the question.

The answer is, by using devices other than wide changes of volumes in the music to secure effects. It is not impossible to produce music, rich in dramatic values, and pleasing to the listener, by variation of the tempo; rhythmic pulsations, carefully thought out to give subtle framework for the thematic material in the score; ingenious phrasing. It is also important to arrange music for the microphone pickup so there is movement from one instrument to another rather than masses of instruments to gain effects.

By practice before the microphone the musician will acquire the feeling of dynamic ranges, under different room conditions, and will become a joy to the recording engineer.

It is also advisable to use small ensembles before the microphone, producing the music in miniature of an even clevel of volume, which can be made louder or softer electrically, thereby making it easier to match in volumes, when the film is cut. pieces, under the baton of a skilled conductor, in the new art of playing before a microphone, can do some astonishingly good work. Three violins, playing one part, can represent the whole section of a large symphony, when they are properly placed within the critical area.

Ensembles of singers should rarely exceed sixteen voices. When more singers are required to please the eye, some of them should appear to be singing, but actually remain silent.

Speaking voices before the microphone should be used with consideration of the same principals, as explained for the orchestra. Speakers should be trained in the art of keeping fundamental voice sounds on an even volume level, and should also be able to speak, without in any way limiting their capacities for expression or characterization, on not less than three separate voice volume levels—soft, medium and loud.

Such voice proficiency in microphone technique can only be acquired by practicing before an iron ear, with a recording system which will play-back quickly. Then the speaker can hear himself as others hear him, note variations of volume level, and make improvements almost without thinking. It is admitted, of course, but not generally known, that no one really knows how his voice sounds to others, due to the differences in human ears, and to the resonance of his own head structure when he talks.

Again, with the voice, as with the orchestra and singers, too wide changes in volumes should give way to rhythms, changes in enunciation speeds, inflection in pitch, and unrelated accents to give emphasis.

Consider now the limited critical range of the microphone as a sound pickup. Contrary to the general belief, the iron ear does not pick up sounds faithfully outside of a limited space around it. Here, again, the cinematographer is reminded of the limitation of his lenses, and

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New Lamp Introduced by the Otto K. Olesen Illuminating Co.

By Otto K Olesen, *Pres. Otto K Olesen Illuminating Co.*

With the passing of the arc light and the advent of the incandescent lamp for motion picture work all of those connected with picture making should profit from the experience of the past. In other words, we should profit from what we have learned from the arc lights.

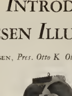

Fig.

History has a way of repeating itself whether in the working out of governments, the waging of wars or the development of lighting equipment. The men who fail to profit by the experiences of the past are the ones who are always found by the wayside eventually.

In the matter of lighting equipment for picture studios, let us look back at the developments in the old style lighting. In the matter of spot, or controlled light we had in the beginning "Spots" of 35 amperes. Next came the 70 ampere spot, then the 120. These, in turn, made way for the 80 and 100 ampere high intensity rotaries and sun arcs

With the advent of the incandescents along with sound we will see the same evolution take place again, depending entirely on how fast the development of lamps progresses. Certainly, we will not stand still and be content with what we now have What the future holds in lighting is something none of us dare predict

However, we know that lamps at the present time, 3 K.W. or over, are prong base Therefore, if 3000 Watt is the limit for the mogul base lamp, why not provide for the future by having equipment that is flexible to this condition? Our organization has brought out a piece of lighting equipment which we feel is destined to save the studios an enormous amount of money, in that we have been looking to the future.

One of the advantages of our new lamp is its socket. This socket, to the thinking man in the studio, will instantly declare itself as a great advance in construction of incandescent equipment. It lends itself to the slightest demand of the lamp manufacturer, and can accommodate any lamp from 10 to 10,000 Watts.

Figure No 1 shows the clamp handle and the mogul adapter can be lifted out as is shown in figure 2 The slip connectors are of the standard type used in studios for the last ten years and are as sturdy of structure as are the adapters.

To illustrate the simplicity of the lamp figure 3 shows a 5 K. W. lamp being placed in the socket. Merely push the two slip connectors onto the prongs, set the lamp in the socket and turn the handle and the lamp is focussed with the mirror automatically.

At this point with the larger lamp accommodation, we must look to the switch and its added capacity, for the larger load. Figure 3 shows one type of switch cover that allows the cable to be separate from the lamp, although this feature is optional.

The 5 K.W. lamp is shown in place in figure No. 4. We also see the switch with cover removed, showing the sturdy construction. This is a **60 ampere** switch, meaning it will accommodate up to 6 K W. lamp without having to use a 24-inch housing.

To the cameraman this means that every lamp of this type will take a 5 K.W lamp instantly. There are no delays waiting for a 24-inch. You just take out the small lamp and put in the larger one. If for exterior

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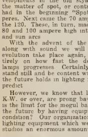

Fig 4

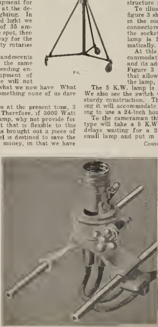

Fig 1

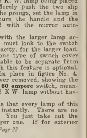

Fig 5

Characteristics of Motion Picture Studio Light Sources

Presented at the Hollywood Meeting of the S. M. P. E., April 9, 1928—A Transaction

By Loyd A Jones and M E Russell

[Communication No 358 from the Kodak Research Laboratories Second and concluding Installment]

At the present time there is no generally recognized unit of photographic intensity corresponding to the internationally accepted visual unit known as the "international candle." In order to express the photographic efficiency of a source it is necessary to have some unit in terms of which to make this evaluation

The question of defining a unit of photographic intensity has been under consideration for some years; at the present moment it seems rather probable that the next International Photographic Congress will adopt such a unit that it will be defined as one visual candle power of radiation equivalent in spectral composition to mean noon sunlight. The quality of this radiation, at least from the visual standpoint, is practically equivalent to that emitted by a complete radiator (black body) operating at a temperature of 5000°K. Spectrophotometric analysis, however, shows that the radiation from sunlight differs appreciably from that of the black body in the region between 300 and 450 $m\mu$, this difference being due largely to the absorption of radiation in its passage through the earth's atmosphere.

It seems logical, therefore, to adopt mean noon sunlight as the quality of radiation in terms of which the unit of photographic intensity is to be defined. The spectral composition of mean noon sunlight has been determined with considerable precision by Dr. C. G. Abbott of the Smithsonian Institute; he made 20 determinations at the summer solstice and also at the winter solstice. The mean of these has been adopted to define "standard white" for use in colorimetry.[3] It has been decided, therefore, to express all efficiencies of standard light sources used in this work in terms of mean noon sunlight. In order to do this the equipment was set up out of doors so that the test panel was illuminated by noon sunlight, a few feet of film were exposed under definitely determined exposure conditions. The illumination incident on the test chart was determined in the usual manner.

Flame arcs. The unit used was a Creco Broadside lamp carrying twin arcs operating in series. This was operated on 110-volt direct current, the trim being one half inch flame carbons as supplied by the National Carbon Company. The Creco unit consists of a white-lined metal housing at the back of which the arcs are located, and on the front of which is mounted a glass diffusing screen composed of narrow strips of Florentine glass. Measuring instruments were connected in such a manner that the current flowing through the two arcs, the voltage across the two arcs, and the line voltage could be conveniently measured. Thus data were obtained from which values of the total energy consumption and the energy consumption in the arc could be computed. This light source is classified as a flood lighting type. The various types of flame carbons used in this equipment were:

2. **White Flame**—National White Flame Photographic (51371).

3. **Pearl White**—National Pearl White Flame Carbons (51371).

4. **Yellow Flame**—National Panchromatic "Y" Carbons (51371).

5. **Orange Flame**—National Panchromatic "O" Carbons (51371).

6. **Red Flame**—National Panchromatic "R" Carbons (51371).

7. **High Intensity Spot.** This consisted of the usual form of high intensity arc mounted in sheet metal housing with condenser lens. The arc consumed 75 amperes and was trimmed with the National high intensity white flame projector carbon with an 11 mm. National Oro tip cored projector carbon as the negative electrode. Tests made with this unit equipped with the usual condenser lens, and then with the condenser lens removed and a silvered mirror placed in front so that the light falling upon the test chart was reflected from the mirror, indicate that the photographic quality of light in the two cases is practically identical. Hence the photographic efficiency values obtained by use of this spot lamp may be applied directly to the various forms of flood units employing the high intensity arc burner as a light source, such, for instance, as the "sunlight arcs."

8. **Sunlight arcs.** No example of this unit was available for use in our studio, and the data relative to visual efficiencies were taken from a paper on this subject by Mr. Frank Benford.[4] The photographic efficiency was considered identical with that obtained by direct test using the high intensity spot light described under 7.

9. **Low intensity arc spot.** The equipment used was a Winfield Kerner unit trimmed with a 1-inch National cored projector carbon as positive electrode and a 7/16-inch Oro tip cored projector carbon as negative. These carbons are of the ordinary soft-cored type containing no flame material and the light emitted approximates quite closely in spectral composition that of a black body operating at approximately 4000°K color temperature. This light may be considered, for all practical purposes, as equivalent to that obtained by using any type of arc employing low intensity carbons, such as Klieg spots, etc

Gaseous conductor lamps. The experiment used in making the measurements on mercury vapor arcs was kindly loaned to us by the Cooper Hewitt Electric Company, Hoboken, N. J. It consisted of two copy board illuminating outfits. One of these was equipped with two 50-inch mercury vapor tubes, each bent in the form of an U. The other unit was equipped with one 50-inch U-tube and one gaseous conductor neon lamp, recently developed by the Cooper Hewitt Electric Company, consisting of a glass tube approximately 1 inch in diameter and 24 inches long filled with neon and provided with suitable starting and operating electrodes. These tubes were mounted in shallow metal housings lined on the inside with a painted white reflector. These units operate directly on 110-volt alternating current line.

It is well known that the light from the mercury vapor lamp is deficient in red and hence in photographic work red objects are rendered as very much darker than is indicated by their visual reflecting powers. On the other hand the light emitted by a gaseous conductor neon lamp is very red in color and red objects are accentuated in

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The Movies Reach College

University of Southern California Is Blazing A Cinematic Trail on Our Western Coast by Inaugurating Motion Picture Lecture Course.

By William Stull, A. S. C.

TO MOST individuals, admission to college is probably one of the proudest indications of manhood attained. Consequently, with the announcement by the University of Southern California of several courses on motion pictures and their related arts, our erstwhile 'infant industry' may be said to have reached its majority.

Compared to other arts and sciences, motion picture production is still young in point of years, but in point of achievement it ranks with the hoariest of them. Conceived in the closing decades of the fertile nineteenth century, developed and matured in these first prolific years of the twentieth, it has compressed into each year more progress and achievement than the more leisurely arts have encompassed in a score. Judged by its progress, screen art is as old as any of its sisters; considering the development of its technique, and the number of truly great works of art left for posterity, it is fully worthy of equal recognition. Now it is gaining academic standing commensurate with its position as an art and as a factor in the life of the world.

It is no longer the purpose of a university to teach its students ancient, dry-as-dust Latin and Greek alone, rather, it is intended to give them a truer appreciation of all that touches modern life most closely, to prepare them for it, and for a career of useful citizenship in whatever profession they may best be suited to. And what one force exerts so great an influence on contemporary life as the screen? What else has become so much a part of humanity as the movies? Wars may rage—empires crumble—rulers come and go; but none of these affect the life of the individual nearly so intimately as does the cinema.

The existence of such a condition makes it the absolute duty of progressive colleges to investigate it, and to endeavor to give their students an understanding of its underlying causes and basic principles. In justice to American universities as a whole, they have tried to do this: some of them have essayed courses in various fields relating to pictures; all of them have shown interest in the problem. And a problem it has been, too, for the art is such a peculiar one, and so new, that no standard means of teaching has been evolved. There are no textbooks worthy of being termed standard; no one competent to teach, other than the men and women actively engaged in the industry itself. There are grave economic problems, too, in striking the fine balance between training sufficient new blood to keep the industry vigorous, and overrunning it with a horde of workers for whom there can be no work.

With this in mind, the University of Southern California and the Academy of Motion Picture Arts and Sciences have mapped out plans for two basic courses. The first, which is now under way, is a purely cultural course designed to give the average student a better appreciation of the pictures which constitute so large a part of his entertainment. The second, which is being organized, is for the limited number who may be found fitted to specialize in active preparation for definite work in the literary and technical branches of the industry. This is being prepared with the utmost care, and all possible precautions to ensure its giving bona fide training to the right individuals, and still preserving the proper economic balance.

Of it, Karl T. Waugh, under whose charge, as dean of Liberal Arts, the new courses come, says, "What the industry needs, and what the University can give, is men and women trained in the fundamental subjects of physics, chemistry, optics, art, architecture, English, dramatics, psychology, etc., with particular application to the chemistry of the film, optics of motion picture camera-work, the psychology of perception and interpretation, the art and architecture of motion picture design, stagecraft, dramatics, and the elements of plot and scenario writing. A school of motion picture sciences may thus be comparable to schools of mining or civil engineering or architecture.

"It is the understood agreement between the Academy of Motion Picture Arts and Sciences and the University of Southern California that in consideration of the University's planning these courses and offering them to duly qualified students, the Academy will give preference to those who have had the training in the courses outlined. In the College of Liberal Arts of the University we have worked out a new and adapted curriculum which now includes three courses, leading to appropriate degrees.

"1. A course in the science and technique of cinematography.

"2. A course in composition, literature and criticism for moving picture scenario and continuity writing.

"3. A course in architecture and the fine arts with major emphasis on (a) architecture, (b) decorative arts, or (c) electrical engineering.

"A course for the training of voice and expression for those arriving at the profession of screen actor is under consideration.

"Library and study facilities for the course are provided at the University, as well as the advantages of a museum of Motion Picture Arts which adjoins the campus.

"The Academy aims to establish a technical laboratory and a research library to facilitate the studies of those who are advanced in the course, while the University opens its doors to those who must receive the necessary fundamental training.

"The first two years' work is in general similar to that in Liberal Arts. During the last two years occurs the major part of the specialization and field work."

Decidedly an ambitious program, but one which, if carried through with patience and moderation, should be of inestimable benefit to the industry as a whole.

The purely cultural course in motion pictures, now being offered as **Photoplay Appreciation**, is intended to serve the double purpose of being a survey course in the subject for those who intend to make motion pictures their profession, and of giving the average student a better appreciation of all that goes to make a motion picture. As it is being given this year at the university, it is a course of lectures by leading figures of the industry and certain qualified professors. It is divided into five parts: first, an introduction, covering the scientific foundations of the art, its early history and development, the theory of silent photoplay, the application of sound, and the current trends and tendencies in the art. Then comes a more elaborate consideration of the important elements of the photoplay, the story, the actor, and pictorial beauty.

The third part of the course comprises lectures on the commercial requirements of the industry, and on the principles of criticism. The fourth part treats the psychological, esthetic and sociological aspects of the photoplay, while the final division concerns itself with a summary of what has gone before, and a discussion of the future of the art. As it is now being given, it serves its dual purpose admirably, but it is probable that in the future the course will be divided into two separate divisions, one for the students whose interest in the subject is from the purely cultural viewpoint, the other an advanced survey

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New Film Process Announced by Consolidated Film Industries

Claim 50 Per Cent More Life and Beauty for Film

A new film process employing a secret formula and a method for coating the emulsion side of film, which the sponsors guarantee will increase the life of an average print by at least fifty per cent, has been announced by the Consolidated Film Industries, Inc. This new method, to be known as Consolidizing, engineers of the company say is based on a formula which differs radically from those which hitherto have been utilized to protect the emulsion side of motion picture film.

The Consolidizing process will be applied to new prints only and will be exclusive with the company's laboratories. The guarantee that the new treatment will prolong the life of prints at least fifty per cent, officials said, is based on proved results obtained in a series of exhaustive tests made at the Consolidated laboratories over a period of several months.

Experts of the company said that the treatment consists of applying a chemical compound to the emulsion side of the film as soon as new prints have been made. The coating formed over the emulsion assures durable protection which preserved the moisture contained in the emulsion of a print in new condition and protects the emulsion from oil, dust and scratching.

Ever since investigation definitely established the causes mainly responsible for deterioration of motion picture prints, engineers and chemists have carried on extensive experimentation to develop an efficient protective agent or process to preserve the necessary moisture in the emulsion, and protect it from oil, which penetrates and stains the emulsion, and dust particles which cause abrasions. The tremendous saving to the industry resulting from such an accomplishment has long been a challenge to the technician and the laboratory worker.

With the introduction of sound film using the film track method, the necessity for such a process has become more pressing. Because due to the sensitivity of sound reproduction by the light process the slightest damage to the film is translated immediately to the reproducer, causing extraneous noises and distortions destructive to the natural quality of the reproduction. So important has become the necessity of keeping sound track film absolutely free from dust and oil spots that extra precaution is urged on all projectionists and those who handle film. One technician suggested the adoption of the slogan, borrowed from another field and made nationally famous by advertising, that "a clean film never squawks."

The protective coating formed by the Consolidizing method is absolutely transparent adding nothing to the density of the film. As a matter of fact, due to the preservation of moisture and protection of the emulsion against oil stains, engineers of the company said experiments proved that added brilliance is imparted to the projected image from a film treated by the process.

A. S. C. Committees Named

President John F. Seitz of the American Society of Cinematographers last week announced the following appointments to the society's committees for the coming year:

Public Relations Committee—John W. Boyle, Chairman; Karl Struss, Joe Dubray of Chicago, Georges Benoit of Paris, Gaetano Gaudio, H. T. Cowling of Rochester, Claude McDonnell of London.

Research and Educational Committee—Alvin Knechtel, Chairman; Victor Milner, Joe Dubray, Ned Van Buren, Douglas Shearer, Hal Mohr, Dan B. Clark.

Membership Committee—Fred Jackman, Chairman; Sol Polito, Ross Fisher.

Social and Entertainment Committee—Hal Mohr, Chairman; John W. Boyle, Fred Jackman

Production Committee—Dan B. Clark, Chairman, Karl Struss, Elmer C. Dyer, Wm. Stull, Walter J. Van Rossem.

Cutting Movietone Pictures

Something More Than a Pair of Scissors Is Necessary in the Cutting of Sound Pictures Where Perfect Synchronization Is Essential

By Louis R. Loeffler

Film Editor for Fox Studios, who was Chief Editor of "In Old Arizona" and "Thru Different Eyes."

Though the cutting of Movietone film differs somewhat from that of silent film the principle of both is fundamentally the same. A well-cut film, whether it be silent or spoken, is one which embodies smoothness of continuity, proper tempo and the intelligent use of angles and close-ups.

The average cutter of silent films when informed that he is about to be assigned to cut a Movietone feature receives the news with trepidation, inasmuch as he has heard various tales of the intricate problems encountered in the cutting of the film. While these tales are more or less true, they should not discourage the cutter in the least, ... especially if he is a person who is willing to use his imagination instead of relying on cut-and-dried rules.

It is not my intention to write an essay on Movietone cutting, but to give a brief outline of some of the problems that constantly arise in the cutting of both negative and positive Movietone film.

First it must be understood that there are two methods of making a sample print of a Movietone negative . . . . one is to print the sound and the picture on separate films, thereby necessitating the use of two synchronous projection machines . . . the other is to print both sound and picture on one film. The latter method, though it involves greater mental effort and more work for the positive cutter, is the more practical of the two inasmuch as once the film is cut and ready for a preview perfect synchronization is assured plus the fact that the negative has not been touched in case there are to be alterations in the film. We will therefore concern ourselves with this method only.

I take it for granted that the reader is aware of the fact that there is a difference of fourteen and one-half inches or approximately twenty frames between the picture aperture of the projection machine and the small light aperture of the sound apparatus. Therefore when a print is made from the negative the sound must be printed twenty frames ahead of the picture in order to be certain of perfect synchronization. Consequently when the positive cutter receives his "rushes" from the laboratory the printer has already "pulled up" the sound twenty frames and the cutter must take this into consideration when cutting his film.

One of the greatest problems to be contended with in Movietone film is that of out-of-synchronization, and the first step toward remedying this defect is to determine whether the sound is too far ahead or too far behind the corresponding action. When this has been ascertained a definite bit of action is selected on the film and an X is marked with a grease pencil at this point. Next the approximate position of the sound for this action is located and an O is marked opposite the sound track exactly twenty frames down from this spot. The film is then projected in such a manner as to see the sound track on the screen.

As an example we will presume that the scene to be synchronized is one which shows a man striking a vase with a walking stick. In projecting the film we have learned that the vase is struck by the cane and several seconds after we see the blow we hear the sound for it. Immediately we understand that the sound is too late and must be moved ahead. An X is marked on the frame of the picture which shows the cane in contact with the vase. An O is marked opposite the sound track exactly twenty frames after the point where the sound of the blow is thought to be. Upon projecting the film again with the sound track visible, we immediately learn whether we have found the correct sound because we will see the O simultaneously with hearing the sound of the blow. It will then only be necessary to count the amount of frames between the X and the O to ascertain just how far out of synchronization the scene is. If, for instance, we count twenty-nine frames, we immediately know that the scene is nine frames out of synchronization and in re-cueing it we pull the sound ahead nine frames. But it is not always that a definite bit of action is found by which one can resynchronize a scene.

There are many cases when a scene consists of straight conversation and when such a scene is out of synchronization the only means of remedying it is to first determine whether the sound is ahead or behind the corresponding action. If the former is the case it will be necessary to first determine approximately how many frames the sound is ahead of the picture, and in threading up the projection machine have the operator enlarge the loop that immediately precedes the sound device the amount of frames that the film is thought to be out of synchronization. Upon projecting the film it will be observed that either the scene will have been thrown into perfect synchronization or that it will be less out of synchronization than it was before the experiment. If the former is the case there is nothing more to do but to count the amount of extra frames in the loop and in recueing the scene pull the sound ahead that number of frames. If the latter is the case it is only necessary to increase the size of the loop, frame by frame, until the desired result is acquired.

If, however, the sound is too far behind the action it will be necessary to reprint the scene immediately and move it ahead (it does not matter if it is thrown out of synchronization in the other direction just so long as the sound is printed ahead of the action), and then thread up the projection machine and proceed as in the first case.

I think that this entirely covers the problem of out-of-synchronization, and though I have devoted probably more space than necessary on a subject that may seem foreign to the one I set out to write upon, I hope I will be excused for having deviated from my course, and in a later article will endeavor to explain some of the problems that have to do strictly with Movietone cutting.

Some Problems Related to Composite Photography

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of an unraveled rope will be more down to scale. For the gnarled trunks of the old Royal oak trees, an inverted root and base of the California grape vine proved excellent. The foliage of the tree was reproduced by pegging into the upturned root some sprigs of the Juniper bush. The railroad track had to be specially cast because the English track shows a clamp to every tie while the American rails are clamped only intermittently. Close-ups of this miniature demanded correctness to avoid criticisms from audiences in England.

Imagine spending four months and $40,000 on the miniature flood scene in "Noak's Ark," which was incorporated into life size foreground action. The Temple in the middle distance and every house in the city beyond was cast individually from models. They were then set into position in an area 300 feet wide and 250 feet deep. Water flumes were laid underground, emerging at the proper points. Perforated pipes were installed overhead for the rain. Then every house was removed, broken apart and reset with clay in the broken joints in order that the flood would break them up realistically. As a precaution, wires were tied to pull them apart if the water failed, and as a second precaution, dynamite caps were wired to a remote control. An immense tank containing 600,000 gallons of water was built about and to the side of the set.

Three hundred actors were on the life size set in the foreground. One hundred and five skilled men were at the various stations controlling wind machines, rain, flood water, lighting and other effects. Eleven high speed cameras with various focal length lenses were hidden between the foreground set and the miniature. Four normal speed cameras were on the foreground action. The high speeds picked up the individual details. The shot had to be photographed between 11:45 a. m. and 12:20 noon, otherwise the sky backing behind the miniature would cast a shadow. It took nerve to flash the starting signal, for there could be no retakes. It was all over in two minutes, and, fortunately, it was not necessary to retake; but the supervising technician spent four days in bed from the nervous reaction. The Johnstown flood, done a few years ago, was a parallel case with a similar successful issue.

Where long distances are represented in a short depth, a forced perspective is resorted to and consequently miniature buildings have the physical appearance of cubistic nightmares, but you can rest assured they are geometrically correct. For this and other reasons, a trained technician insists upon being left alone and even refuses to let a director see anything until it is on the screen.

I know of a case where the studio equipment provided a gravity railroad, but the scenario called for a train climbing the turns and grades in the snow-covered Alps. So the ingenious technician tipped all the trees, telegraph poles, etc., out of perpendicular and even built all the roadside houses leaning forward at an acute angle to the track. The train was photographed coming down hill, but on the screen it was going up hill.

When glass top shots are photographed simultaneously with the action of the lower portion of the picture, the shadows must be painted to conform to the position of the sun on the lot. This requires a prearrangement with the director as to the time of day he expects to shoot. An improved method is to make the action shot first, and by securing a balanced transparency from the negative, the glass top portion of the scene can be superimposed in the laboratory and thus the shadows of the glass scene can be painted to correspond with those found on the action negative. The portional scene on the glass automatically replaces the undesirable portions of the original shot.

It never rains in California unless a technician leaves

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S. M. P. E. Convention as Seen by Editor

Continued from Page 7

to us the distortions occasioned by variation in width of the scanning slit and by varying its position. Interesting is a very mild expression.

A real treat was offered the Assembly by Mr. C. W. Hulett, who permitted his tonsils to rest and delivered his paper via what I would call an "Optical Phonograph." He just ran his reproducing apparatus film upon which his lecture was recorded on parallel tracks, eight of them on the same film, if I recall correctly. It was a lecture doubled with a practical demonstration. I don't want to comment upon this, because I want your imagination to soar a little bit.

The Mitchell Recording Camera, equipped interchangeably for variable area and variable density sound recording, was introduced by a brief lecture, illustrated with lantern slides. The apparatus itself was on the floor, and I want to say that it appeared to be a very neat "job."

A quick dash from the R.C.A. projection room to the Photophone Studios in Grammercy Park, where we enjoyed a delightful cafeteria style luncheon and authorization of roaming around the Studio where sets, lighting systems, camera, camera-booth, etc., etc., were exhibited. Our genial friend, Frank Ormston, who is in charge of the activity of this studio, acted as host, and any absentee who knows his good smile and thorough enthusiasm will, undoubtedly, miss not being present.

Due to lack of space, the Convention had to be divided into two sections for this day, and while the section of which I was not part was spending the afternoon at the R.C.A. projection room, I followed the rest of the congenial crowd back to the Park Central Hotel, where I listened to Frank A. Benford, D. K. Wright, T. E. Finnegan, and R. B. Dickson, who, respectively, lectured on Mercury and Neon Lamps, Incandescent Lamps, Classroom Films, and on Fire Protection on projection apparatus. The official banquet was scheduled for that night, and so we donned our dinner regalia and assembled on the Roof of the Park Central. A list of those present and those mentioned officially or in conversation from table to table, would reveal the names of the realm of filmdom.

I am going to punish you, Hal, by sending you a photograph taken at the banquet and let you pick out "Who's Who. So find Mr. Crabtree, the toastmaster; L. C. Porter, the President of the S.M.P.E.; Mr. McGuire, the genial Publicity Director of the Society; Elms, who is greatly responsible for the 70 mm. film; and, last, but not least, King Charney, of the Hollywood Agfa.

The usual speeches were most unusual at the end of the banquet, and as long as I live I will remember the splendid personality, fine voice, captivating smile, and ready wit of Mr. Lee DeForest.

After satisfying the "inner-man" we gathered in front of the screen and admired the "Show Boat"—it was in the wee hours of the morning that Bessie Love was still yelling for her hat in the "Broadway Melody."

A little dancing afterwards?—Of course!

And so Thursday morn came. The Arrangement Committee had been considerate enough to call the meeting for 10 o'clock in the morning, and we all listened to Major W. E. Prosser talk on Motion Picture activities of the Army; we admired the fluency of J. I. Crabtree, who told us of some properties of Fixing Baths; and we conducted, under the leadership of L. A. Jones, a brief but interesting discussion on some Standards which were proposed and accepted by the Membership of the Society.

Due to weather conditions, which forced the Paramount Studios to call on the stages the Companies which were scheduled to work outdoors, our visit to the Studio had to be cancelled from the program. This was an unexpected and sad occurrence, solely due to sound pictures. Prior to the Talkies, Paramount would have done its best to give us a show by keeping indoors as many companies as possible. Sound excluded the possibility of our being admitted in the studio. You know why—and how!

So the afternoon was devoted to more papers, especially those the authors of which were not present at the Convention.

J. I. Crabtree, who apparently is the official "remplacant" of absent authors, graced the resonances of the room with well cultivated tone values and brought to light, among other things, the extraordinary efficiency of our Karl Struss behind the battery of cameras used in "Coquette."

The Academy of Motion Picture Arts and Sciences was present in the form of a "compte-rendu" from Mr. Frank Woods.

Dinner and the final re-union at the Bell Telephone Laboratory Auditorium, where the S.M.P.E. and the Acoustic Society of America were assembled in joint meeting.

It was the first joint meeting of the S.M.P.E. with another society, and it was the very first meeting of the newly born Acoustic Society of America. The event was properly cheered and importance was added to it by the splendid lecture delivered by Dr. H. D. Arnold, Director of Research, Bell Telephone Laboratories. I assure you, Hal, that it was very worth while traveling a few thousand miles to listen to Dr. Arnold and to hear his remarkable demonstration. It would take a volume to describe the thoughts that this lecture awakened in my mind. I want to assure you, Hal, that sound is going to be mastered by men as men now master other physical phenomena.

All in all, it was a very nice Convention—more than nice. It was imprinted with a stamp of Friendship and true collaboration that have characterized all the S.M.P.E. Conventions.

Friendships were solidly bound—old ones were renewed—new ones were created, and the dispassionate, frank, and sincere discussion of the problems which are faced by the technicians of the Motion Picture Industry will, as usual, bear fruit.

After the Convention was over I retired to a secluded spot and buried myself in thought. I thought of the last Spring Convention in Hollywood, a mere year ago; and I thought of this Convention of 1929, and I truly marveled at the progress made in such a short span of time. I thrilled at the thought that I am even so small a part of this great scientific Industry of ours.

Au revoir,

JOE DUBRAY.

A. S. C. Members Win Notable Honors

Charles Rosher, Karl Struss and Roy Pomeroy, members of the American Society of Cinematographers, were signally honored on the night of May 16th, when, at the annual banquet of the Academy of Motion Picture Arts and Sciences, they were awarded prizes for their work during the past year.

Rosher and Struss were given the award for the best cinematography of the year in "Sunrise." Pomeroy was given the first award for engineering effects in "Wings." Rosher being in England, Struss accepted the award for both. The prizes were statuettes of gold and bronze.

A notable array of more than 400 screen world individuals were present at the banquet which was held at the Roosevelt Hotel, Hollywood. William C. DeMille acted as master of ceremonies and made the awards.

Recent Releases of A. S. C. Members

"The Pagan"—M-G-M—Clyde DeVinna.
"Love in the Desert"—F.B.O.—Paul Perry.
"California Mail"—First National—Frank B. Good.
"Honeymoon Abroad"—World Wide—Rene Guissart.
"Saturday's Children"—First National—John F. Seitz.
"Show Boat"—Universal—Gilbert Warrenton.
"The Border Wildcat"—Universal—Joseph Brotherton.
"The Hole in the Wall"—P-F-L—George Folsey.
"The Red Sword"—F. B. O.—Nick Musuraca.
"The Duke Steps Out"—M-G-M—Ira Morgan.
"Not Quite Decent"—Fox—Charles Clarke.
"Yellow-Back"—F. B. O.—Phil Tannura.
"The Squall"—First National—John F. Seitz.

New Lamp Introduced by Olesen

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work on a stage a 2000-Watt lamp will not "bore in" far enough, simply change and put in a 5 K.W.

Due to the added cost, studios as a rule have a limited supply of 24-inch type lamps. But with our new type lamp, each lamp is a potential 24. However, do not let me mislead you into thinking that this lamp will give as much light with a 5 K.W. as will the 24-inch lamp. BUT this equipment with a 5 K.W. lamp will do things that cannot be done with a 24, and will give much more light than the conventional G-48 2000-Watt.

In the first place, a 2000-Watt lamp is only 20 amperes input and will not reach out far and cover any great area. But a 5000-Watt, being two and one-half times as great, or 50 amperes, can be expected to do far more.

Secondly, by using a 5 K.W. on a large set we have the advantage of a "beam," or what the mirror is designed for. This "beam" condition gets away from stryation and lends itself to a small, clean field or spot. Then, too, with the larger lamps comes the problem of heat, and the problem of lamp life.

In this matter of heat our equipment which we are introducing has another feature which we consider a distinct advantage. It is real ventilation. Figures No. 5 and 6 show the ventilation of the main heat stream. Also we see the ventilation holes above the main switch and a corresponding row of ventilation vents or holes at the top of the lamp. This vent causes a circulation of cold air between the shell and the lining of the lamp, which we feel is a feature of no small importance.

Figure No. 7 shows the lamp complete with the 5 K.W. We have featured sturdy construction rather than extreme light weight because a lamp must be able to stand up under the wear and tear of constant usage, and the matter of 4 or 5 pounds difference in weight is of much smaller import than when it comes to long wearing lamps.

We have used a tilt clamp handle which is an automatic device that will be a time-saver in production in our estimation. Figure 8 shows a close view of this. No. 1 in this photograph indicates a leather disk 6 inches in diameter which clamps between the head and yoke

Fig 3

Fig 4

brackets. No. 2 is the tension handle. This is set to a certain tension in accordance with the requirements and needs no further attention after being set. The lamp may be tilted to any desired angle and it stays in position because it is locked automatically. A heavy spring and a ball-bearing thrust bearing accomplishes this without delays. No. 3 is the positive lock to be used while the lamp is in transit and while handling and rigging or striking the set.

With these improvements, we naturally feel that this lamp should be worth more than the ordinary equipment. But we have decided that we will pass along our developments to the industry at no added cost, so it is priced the same as the other type.

Fig 5

Some Problems Related to Composite Photography

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a sky backing on the lot overnight. Recently a clever avalanche set had been tested and was ready for the next morning's schedule when ice would tumble down the foreground miniature ravine and in the middle distance, several tons of corn flakes would be dumped upon one of our most pampered stars. It rained during the night and Mount Blanc in the background, covering 1200 square feet of photographic enlargement, was found rolled up in a heap underneath the scaffolding.

Scene 83 required a French cruiser to pass a fortress at a harbor entrance and just miss being blown up by a submerged mine. It seemed more feasible to build a stationary fortress and to move the water and cruiser past it. A roller propelled tank about thirty feet square and a foot deep was built of two-inch lumber. Repeated photographic tests were made but the exploding dynamite just under the water's surface did not seem to throw the explosion high enough. About four in the morning, when everyone was exhausted, the exasperated "powder man" weighted an extra charge and sank it to the bottom. Twelve inches of water happens to offer more resistance than a two-inch plank. Consequently, when the explosion occurred, 6500 gallons of ocean landed on the floor of the stage and the cruiser had nowhere to go.

There is a slogan among the technicians "It can be done," and among the producers "Do it."

Outside of personal experiences, I am indebted to the trained artisans of the industry for much of the information given. Among my contributors are Ralph Hammeras, winner of last year's Honorable Mention Award of the Motion Picture Academy of Arts and Sciences; Fred Jackman, technical supervisor of "Noah's Ark;" Alvin Knechtel, E. Roy Davidson and Ned Mann.

SWITZERLAND

On March 8th one of the Zurich Cinema Theaters, "The Orient," advertised the projection of a sound film, the first talking picture to be seen and heard in this country. Tickets were to be sold five hours in advance of the performance in anticipation of the rush.

GAME IN THE GOBI

J. B. Shackelford, A. S. C., Returns from His Fourth Trip to Asia with the Roy Chapman Andrews Expedition.

[This little sketch of life in the oldest part of the world is done in the spirit of fun, by Mr. Shackelford who, as a globe trotter is in the class of Herford Tynes Cowling, John Dored, John W. Boyle, Jack Smith and others. Here Schack takes a good humored shot at the predatory male whose greatest joy is to have himself photographed with one of his quarry. In a future issue Mr. Shackelford will give his impression of the Gobi and the scientific work done there by the Chapman expeditions in the interest of the Museum of Natural History of the City of New York.—Editor's Note]

By J. B. SHACKELFORD *A.S.C.*

For the luva Mike, don't tell the Missus that you are going to print the whiskers. She ran across some of the portraits one day and oh, boy! Was going to tear up the whole lot, negatives and all.

Said she: "For heaven's sake don't you ever let any one see those terrible pictures—just like you men—you'd all revert back to the stone age if it were not for but for a real thrill and test of daring I decided there was just one more big thing to do besides washing an elephant. Give me a big sarafi of gun bearers and my arsenal of trusty weapons and turn me loose in that big back country away up heyond in the haunts of the giant Jerboa of Mongolia, the most ferocious species alive today.

Well do I remember my first Jerboa hunt. It was a glorious day when I fared forth with the pick of guides, gunbearers and Jerboa hunters. It was just at the crack of sunset when we set out afoot across the land of the dune dweller in search of this nocturnal beast, for this fierce creature roams afield only at night and the thrill of hunting the giant Jerboa in utter darkness can little be imagined by one who has never experienced it.

Top—at work in camp Right—The Akeley all set up and nothing to shoot Left—Close-up photography on a dinosaur fossil Below—Bathing costume in the Gobi Note size of bath-tub and non-skid soap.

us wimmen, etc., etc." Maybe she's right, but it is pretty sweet to get out in the big open spaces once in a while and clip the ole hair close, let the whiskers grow and forget all about 'stacomb,' razors and face creme—especially in the Gobi desert.

Some folks think it is a lot of terrible hardships, privation and danger, but this was my fourth trip over there and even with the sandstorms, bandits, bitter cold in the early spring to 145° above in the summer, one does get used to it. Exploring new country every day, hunting mountain sheep, jerboas, ibex, wild ass, antelope gazelle, geese, ducks and grouse; photographing the native life, digging up ten-million-year-old dinosaur eggs and fossil bones as big as a man's body; Chinese servants waiting on you hand and foot, three squares a day and more (some days); no traffic cops nor boulevard stops—yes, it's a tough life.

Speaking of hunting, I have heard of the mighty hunters and their lions of Africa, their tigers of India and Siberia, their Ovis Poli of the Tibetan Steppes, their kodiak bears of Alaska, their whiffle hens and what nots,

Our progress was painfully slow across the untrodden wastes till finally about midnight we reached the habitat of the Jerboas and stealthily approaching their caverns we listened for the weird night cries that would betray their secret feeding ground. Faintly in the distance we heard the call of one Jerboa to another as if to warn its mate of approaching danger. It was a cry that made my spine crawl and my hair stand—a long mournful, shuddery cry, like the rapid approach of a motorcycle siren. We clutched our weapons, for those were tense moments, and laboriously crawled inch by inch, till at last we reached a high knoll where we could overlook the valley of these giants and select a head for a trophy of this never-to-be-forgotten hunt.

With bated breath, for we were practically exhausted by our long climb, I drew my binoculars from the case and began a survey of the situation. Sure enough, there they were, feeding on the lush growth in the valley below, the weaker of the herd in the center and surrounded by the powerful males for protection. There

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As Summer Comes

AND now it is June again! Vacations are in the offing, and thoughts of picture-making once more come to the fore. While some people here and there have been fortunate enough—or enterprising enough—to be able to shoot almost as usual during the winter, most of us have found only the time to make an occasional scene, and to edit last year's output.

That's one of the good things about winter, that change of activity from active production to thoughtful contemplation of what has already been produced If past work is carefully studied, one can usually find plenty of room for future improvement. For instance, that matter of exposure. How many of us can be satisfied with our results there? How many forget last year that the same changes of season that brought the warmer weather also brought an equal increase in the strength of the light?

There's something for everyone to remember, especially those who have been shooting the winter through. The light doesn't look so different, but how differently it does affect the film! Unless we keep this in mind, we're likely to get a most discouraging crop of flat, burned-out negatives of the very scenes we most cherish.

A good rule for the amateur cinematographer to remember is to cut the diaphragm down at least one stop smaller than would be right for the same scene during the winter; but that's hardly a help with the new and unfamiliar subjects we're likely to meet on our vacations, during June, July, August and September. A more specific suggestion is to stop down to f.16 for sea, sky and beach scenes, for mountains or distant landscapes, if the day is bright. If it isn't, use f 11, and if it's really dull, open up to f.8. For open landscapes, and all ordinary action where there is no heavy shade, f.11 on a bright day, f.8 on darker days, and f.5.6 or f.6.5 on really cloudy ones. If part of the field is shaded a bit, as by trees or houses, f.8 will do the trick, unless the clouds call for the wider openings of f 5 6 or f.6.5; of course heavy clouds demand f.4. If the scene be wholly in the shadow, the various degrees of light require respectively f.5.6; f.4; and f.3.5. Where the shade is very heavy, bright days require f 4, hazy ones f 3 5, and really dull ones demand either an f.1.9 lens, **wide open**, or a reduced camera-speed—which isn't recommended, due to its effect on the action.

If any of these scenes are tried earlier than two hours after dawn, or later than two hours before sunset, the increased yellow content of the light demands that the next larger stop than the one recommended be used All of this is a safe rule to follow anywhere except in the tropics, where special conditions apply, and for which special, individual advice is the only safe rule. Through the Technical Department, the advice of several A S.C. members who are experienced in tropic photography is available to individuals contemplating work under such conditions.

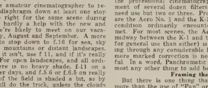
Then there's that matter of color-rendition A great part of the visual beauty of most scenes is the contrasting color-values of the different objects and planes. Despite the perfection of ordinary film, it will not give the same rendition of colors that the eye sees Probably last year's vacation films showed that? The beauties of the Yosemite, the glories of the Grand Canyon, the verdant quietude of the Adirondacks, all depend for their greatest beauty on color and tone-contrasts which are impossible to render in ordinary film.

The answer is, of course, Panchromatic film, which is now available almost everywhere for both 16mm and 35mm cameras. Its use is bound to bring a sharp and immediate improvement in all sorts of work and regardless of the skill of the user It is a mistake to believe that filters must always be used with "Pan" They are, it is true, a great help; as a rule, they are needed to get the fullest benefits from the film; but they are not by any means indispensable, and in some cases they are a positive harm. In portraiture close-ups, for instance, they should never be used, for they make flesh tints unpleasantly light, and often do disconcerting things to a feminine subject's make-up. Yet, unfiltered, "Pan" gives markedly improved renderings of tone and color, but to utilize its full capabilities, some filters are advisable, though over-filtering should be avoided. While some of the professional cinematographers maintain an assortment of several dozen filters, the amateur, of course, need use but two or three. Probably the most useful pair are the Aero No. 1 and the K-2 With them almost every condition ordinarily encountered can be successfully met. For most scenes, the Aero No. 1 (which is about midway between the K-1 and the K-2, and more practical for general use than either) is sufficient, but when shooting through any considerable haze, or on subjects where more marked correction is needed the K-2 is very useful. In a word, Panchromatic film will do more than almost any other thing to add beauty to one's film.

Framing the Picture

But there is one thing that affects the results even more than the use of "Pan" or any other mechanical aid, and that is the user's brain-work. The modern cinema camera is a marvellous little mechanism, but it is still a machine. It cannot think for itself. It cannot choose what it shall see and what it shall ignore, that is for the user to do. Therefore, if one wants beauty on his screen, he must be sure that there is first beauty placed before eye of his camera to be recorded. He must be sure that there are no jarring, discordant notes in any part of the picture, that the action is intelligent and attractive, and that the whole forms a pleasing composition.

Composition is no highly involved mystery, comprehensible only to great artists; but is a simple, workable practice of always carefully considering each scene, to be sure that it will be pleasing in itself, before ever turning a crank. In discussing the subject, Victor Freeburg remarks, "A remarkable thing about composition is that it cannot be avoided. Every picture must have some kind of arrangement, whether that rrangement be good, bad, or indifferent. As soon as an actor enters a room he makes a composition, be-



cause every gesture, every movement, every line in his body bears some pictorial relation to everything else within range of our vision. Even to draw a single line or to pick a single point upon a sheet of paper is to start a composition, because such a mark must bear some relation to the four unavoidable lines which are described by the edges of the paper."

Thus we are all condemned to make compositions, whether we want to or not, as long as we use any sort of camera. As this is the case, we might as well make good ones while we're at it. The first step, of course, is in making sure that the picture forms a harmonious whole. Then, there are endless possibilities in emphasizing some one part of the picture by means of the rest. The simplest example of this is in the use of convenient objects in the foreground as a natural "frame" for the rest of the picture. It is simple, and, being simple, is enormously effective.

At least one or two examples of the use of artistic framing can be found in any well-photographed film drama. The amateur, on his part, may well use the principle of framing to add beauty to his own scenes. Almost everywhere a little thought will disclose possible natural frames. A group of fair-sized trees, a couple of hundred feet from the action, makes an effective frame, if the camera be placed twenty or thirty feet behind them and focussed on the action rather than the frame. Arched windows, colonades, overhanging branches and hundreds of other familiar objects can be used to make excellent frames for action; and, when properly selected, can be most helpful in giving emphasis to whatever part of the picture the important action is to occur.

Of course, the frame must not be emphasized for its own sake; the focus must almost always be set for the action, and the exposure also for the action. The frame, if left thus to take care of itself, will do so, and be a most powerful aid to composition, and to the proper emphasis of the important parts of the scene. And, after all, the purpose of any scene must be to tell a story, to tell it quickly, economically, and beautifully; and to do this, the thing to be remembered is that a picture, to accomplish its entire purpose, must be more than a mere visual record. It must be a pleasing succession of moving patterns of beauty, for in pictures, as in nearly everything else, the beautiful movement is the most efficient.

One has only a certain amount of energy available when viewing a picture, and if the beauty of the scene is so craftily controlled as to make the actual **looking** and **seeing** easy, there is just that much more available for grasping the meaning of the scene, and for enjoying the emotional result conveyed thereby.—[The Editor.]

The Movies Reach College

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course for those who plan to make motion pictures their profession.

Due to the enormous popular interest in motion pictures, and the eagerness of practically all of the major educational institutions to present to their students such a cultural course on the subject, there are being evolved from this course material and methods for its extension to other institutions. From the lectures, which represent the combined efforts of the best brains in the industry and the University, there are being codified textbooks which should be of such merit as to be regarded as standard works for a long time to come. In the classrooms are being evolved methods of presenting the subject-matter most efficiently and to the best advantage.

Of course the feature contributing the greatest popular appeal to the course, the actual presence of the lecturers—men and women who have mastered their craft, and in so doing made their names household words the world over—obviously cannot be repeated at all of the hundreds of colleges throughout the land where the course will be in demand.

However, in place of the actual lecturers it is planned to send Vitaphoned reproductions of their lectures to the various schools, using, until the various institutions have found it advisable to make their own sound installations, a most ingenious portable apparatus which has been specially designed for the work by the Western Electric engineers.

In this way it is hoped that while the actual lecturers can be had only at Southern California, the lectures will be available to all universities interested in the work. The Southern California institution will, however, due to its location at the heart of the industry, undoubtedly remain the fountainhead of these courses—the laboratory where new methods are evolved, and from where they are passed on to the rest. Of course, no other university in the world can hope to rival the advanced courses now developing there.

Clearly, both of these courses are of vital importance to the industry, and deserving of its whole-hearted support. The value of the advanced course is at once evident; but the other, the purely cultural one for the average student, naturally gives rise to the question, "Why should we work to give all this information to people who never expect to get nearer to us than the theatres that show our pictures? What practical use it it?"

The answer lies in the question itself. If they come that close, they are directly customers of everyone in the industry. If these customers can be educated to be a market for better pictures, the whole industry, and consequently the individuals composing it, will benefit proportionally.

The screen has been criticized for the juvenility of many of its stories and themes: the defense has always been that the average audience was juvenilely minded, and demanded entertainment becoming to its mental level. If the mental level of the audience be raised, if ever so slightly, better pictures are possible and better pictures will attract thousands who have not previously attended the cinema just because of its juvenility. And this increased audience will be directly reflected in better working conditions throughout the industry, which is a very practical result indeed. If there is even a possibility of doing this by such work, is it not worth while?

Of course, the total number of graduates from all the colleges in the country are only a small part of the great daily film audience, yet they have a great influence over the whole: they are the one small lump of leaven that can leaven the whole mass. It has been said that the value of George Pierce Baker's celebrated play shop at Yale lies not in the fact that it frequently produces a notable playwright, but in that it produces every year several score young men who have been so trained in the art of the theatre that they know and want the best. They probably are never active in the professional theatre, but as each of them goes his way, he becomes in his own community the nucleus of a similarly-minded group of people who not only serve to make possible the art—and little-theatre movements, but also directly support the professional stage in the form of repertory theatres and the better travelling companies.

If that has been true of this one group, what can we not expect of such groups as this at Southern California, and its inevitable extensions, dealing with a subject so firmly entrenched in popular favor and interest as motion pictures?

No one can deny that for the last few years the moving picture industry has been passing through a period of financial depression. Box-office receipts have fallen off alarmingly the world over, and in consequence the personnel of the industry has suffered. The talking picture has been a financial godsend to the industry, but it has not answered the cry for better films. Silent or talking, better films are the industry's greatest need today. They are artistically possible, but unless it can be surely known that there is an adequate market awaiting them they may not be held commercially advisable by the production heads, despite the obvious, crying need for them. But with such courses as these to educate a truly appreciative audience that can definitely recognize better film, **and that will shop for its entertainment as it does for any other commodity it buys,** they are inevitable, for they will have the assured market they need. With their coming will also come remedies for the many ailments that afflict the industry today. And with the removal of these troubles we may expect better economic conditions in the industry than ever before, and greater artistic achievements than even the greatest heretofore; the full flowering of the screen into its long-heralded place as the one universal and all-embracing art-form for the ages.

ITALY

An agreement between the Italian National Moving Picture Association and the German U.F.A. has been signed, through which Italian Talking Films are guaranteed protection in Germany. The agreement embodies a mutual exchange of German and Italian Films.

INFORMATION FOR AMATEURS

Amateurs—Send your problems to this department and have them solved by the world's finest cinematographers—the members of the A. S. C. This is your department. Our aim is SERVICE. Write us and find your answers here.

Question from W. McG , Los Angeles: Is there any suggestion you could offer regarding the possible storing at my home of 40,000 feet of 35 mm film? That is, that would not conflict with the collection of insurance policy money in case of fire. This film is highly inflammable and quick-burning. If I had it on the place and evidence of same were discovered by the L A. insurance fireboard could they sue me?

Answer: Common sense should prevail here. Get in communication with your insurance company and with the fire commissioner's office and get the regulations and abide by them No man should want to endanger his life and property or that of his neighbors by having anything in his home that would cause fire. Your question regarding a 16 mm projector will be answered direct by letter.

Question from M. V., of Sand Lake, N. W.: (1) I have a Sept camera with lens stylor F3 5. This camera works at 60th of a second Do I have to make the next larger stop than the Cinephoto exposure calls for to make the right exposure?

Ans : Yes. You will find an arrow governing the Eastman camera on the Cinephoto meter. Turn this until the arrow points directly to the stop indicated on the meter Then make the next larger stop for your camera.

(2) Can Vitacolor filters be used with success in standard cameras, or are they only for 16 mm cameras?

Ans.: The Vitacolor officials tell us that for the present they are only for the 16 mm cameras, but that eventually they will be put out for the standard size.

(3) I have seen some pictures in color, such as "King of Kings." Are they made by handpainting, or how?

Ans. "King of Kings" was made by Technicolor process.

(4) I am told that the American Society of Cinematographers has a school for teaching the art of the cinema. If that is true, do they teach amateurs who want to become professional cameramen, and how much is the cost?

Ans : No, the A.S.C. does not maintain such a school

Question from L. R T , Chicago, Ill : Why is a yellow filter advised when using Panchromatic film for landscape work?

Ans.: Panchromatic film has an excessive sensitiveness to blue and violet as compared with the eye. For this reason a yellow filter is used when you wish to eliminate the excess effect of blue and violet, these two lights being absorbed by the yellow filter.

Question from H. L. R., San Antonio, Texas: I am a bit puzzled about diaphragm stop I have had many pictures appear flat and burned out, when I thought the sunlight was not too strong, can you suggest what I should do?

Ans.: You will find this matter discussed at length under the amateur heading in this issue of this magazine, with a diaphragm schedule well explained.

Question from Mrs. R., Los Angeles, California: Is there any device now on the market which can be used by amateurs for making home talkies?

Ans: If you will write to the Q. R. S.—DeVry Corporation, Center street, Chicago, Ill., they will no doubt be able to assist you They are producing a Cine-Tone device which is said to be very satisfactory for home experimental work The Home-Talkie Machine Corp , 220 W. 42nd St , New York, also makes these devices.

THE FACE ON THE COVER

A Close-up of Richard Dix, Which Reveals a Few Facts Not Generally Known

ONE reads so much about beautiful young women and handsome young men leaving the farm and walking smack into a fat contract in pictures that it is a positive relief to find a screen actor of real merit who has had to really work to reach the pinnacle of success.

Such a man is Richard Dix, the star whose face adorns the cover of this issue of the American Cinematographer And the best thing about Dix is that he admits that he has walked New York's Broadway without two nickels in his pocket, wondering where the next week's room rent—of only two dollars—was coming from That is a healthy sign when one of our stars admits past poverty

To know Richard Dix is to know a real man. He cannot walk down the street but what scores of beautiful women who see him have temporary heart trouble, but it gives Dix no concern. Acting with him is a profession, just as practicing medicine is just a profession to a physician Posing in hotel lobbies or elsewhere is not in Richard's line Perhaps that is one reason why success is his.

Dix was born in St. Paul, Minnesota, and according to family plans was supposed to be there now as a physician. However, Dix had other ideas after playing a part in a dramatic production in which he spoke one line as he dashed across the stage with a spear in his hand

But Dix's father was old-fashioned. He believed that no actor was anything but something that is no-good. So, there were to be no actors in his family. Dix was born with the name "Brimmer," and his father decided that the name of Brimmer would never appear on a theatre program. Dix was of another opinion—but did his father the favor of changing his name, so the family escutcheon was unsullied, as it were.

Dix started life, after quitting high school, by working in a bank. But he secretly studied dramatic art at a dramatic school at night. Then the great Southern gave Dix a hearing and also an offer of $18 00 a week to go on tour with him. But Dix's father stopped that. Finally, Dix consulted with his brother and joined a St. Paul stock company. After amassing $24.00 in cash and some clothes, he headed for New York where he knew real want until he signed with a Pittsburgh stock company.

Life from then on was a matter of struggle for Dix whose salary ran all the way from $25 to $50 a week when he worked But he had vowed never to return home until he was successful, so he stuck. And then came the movies, as the old title writers would say, and Dix landed so well in "Not Guilty" that he was given the lead in "The Christian " All the companies wanted him then, for his performance in that picture still stands out as a masterly one.

Since then Dix has known success—and his father has known what it is to be proud of his boy. He forgot his aversion to things theatrical and even came to Cali-

fornia to live where he could watch his boy at work. Nothing more need to be said about Dix and his acting. The world knows him and cheers for him. And Dix takes it modestly—and continues working just as hard as he did when struggling for his chance.

Dix says a lot of credit for his picture success is due to his best friends, the cinematographers. "Many of the finest ideas that have been given me," says Dix, "were given by the men who photographed me. And without their marvelous ability at lighting and photographing me I hate to think what the present might have held. The cinematographers of today are master craftsmen to be admired by all."

A Complaint

In the May issue of the American Cinematographer a story appeared in which credit was given a certain person for the designing of the Fox-Case Grandeur camera. Since the article appeared the editor has received a letter from H. F. Boeger, president of the Mitchell Camera Corporation, calling our attention to this and explaining that the statement is incorrect.

"Please permit us to correct this misleading statement, by saying that the camera mentioned was built by ourselves," states Mr. Boeger in his letter, and continues, "and is nothing more or less than our regular Hi-speed camera in all its construction, simply enlarged to handle the Grandeur film, and contained no new engineering designs.

"This person," continues the letter, "was in our employ as a draftsman at the time, on detail drawings for this camera under the direct supervision of our Mr. Mitchell, under who's personal direction the drawings were completed."

[Errors and mistakes unavoidably find their way into any publication at times, and we are pleased to run this statement from Mr. Boeger and express our regret that the error occurred.—The Editor.]

Lighting the Big Shots in Chicago

Continued from Page 5

lights with Chrome-plated parabolic reflectors, and six 18-inch Searchlights with Chrome-plated parabolic reflectors

The first problem with which we were confronted was the placement of the equipment. Every available inch of space was filled with seats, sold at high prices, which prevented our using any space which would require the removal of any of these seats. It was decided to build a platform, 40 feet long by 16 feet wide, between the two balconies, suspended in such a way as not to obstruct the view of the customers. As there are no posts or pillars in the building it was necessary to suspend this scaffold by steel cables from the upper baleony. The building being in a state of construction with hundreds of workmen rushing to finish the job in time for the opening of the fight, it was impossible to start the erection of this platform until after twelve o'clock noon on the day of the fight. That meant less than eight hours for the erection of the platform and the complete set-up.

Only alternating current was available, and two legs of 1,000,000 circular mills cable, each 300 feet long, brought the current from the transformers to a specially constructed switchboard on our platform. The current used was about 1000 amperes.

The lessened efficiency of the lamps burning on alternating current made the penetration of the dust-laden air most difficult. As the building was not yet complete at the time of the opening, the air was a fog of cement dust and this was by no means lessened by the tobacco smoke. To cap the smoke nuisance, shortly before the beginning of the final and main bout, the roof of the auditorium burst into flames. Fortunately, there was no panic, as a hundred firemen soon extinguished the blaze. This smoke addition made our job even more difficult. The accompanying photograph will enable you to judge the success of our efforts.

Predicts Cino-Spectrometer Will Eliminate Errors

Inventor of New Device Gives Additional Details Regarding the Uses and Methods of Using the Invention He Claims will Remove Chance of Human Error

By R. E. Nauman, *Electrical Engineer with the Otto K. Olesen Co.*

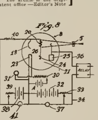
[This is the second and final installment of Mr. Nauman's article dealing with the device he has invented and for which he has applied for patent. The article is the original description written for the patent office.—Editor's Note.]

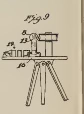
THE present practice of developing is for the laboratory men to take several sections of a film and develop these for different lengths of time, examining the negatives to see which is most satisfactory and then developing the whole film accordingly. As this procedure is dependent on the judgment of the eye it is very faulty.

Presuming with my meter that the camera indicates say, four units of light in taking a picture and developing table shows that this would require a number 6 developing procedure, which would be utilizing a standard developer at a definite temperature for a fixed period of time; and presuming that another film showed that a 3.5 light unit had been used and the table indicated that this would require 6.5 units in developing, the developing may be done accurately without prior experimentation and thus for different lights used in photographing obtaining substantially standard negatives in accordance with such light quantities.

The printing of the film may be regulated substantially as follows, having reference particularly to Figs. 6 and 7.

These figures do not attempt to indicate the structural details of printing machines, but merely some of the essential features. A printing lamp is designated by the numeral 50, the negative by the numeral 51, the positive film by the numeral 52; the light passing through the negative and printing on the positive in the usual manner. In order to record the density of the negative, I mount my spectrometer designated by the photo-electric cell 53 so that light reflected from a mirror 54 and passing through the negative affects the photo-electric cell and hence the meter of the cino-spectrometer; such construction being indicated in Fig. 6 utilizing the circuits of Fig. 8.





As it would require considerable change of most printing machines to install a reflector to project some of the light from the printing lamp through the negative, for some types of printing machines I find it of advantage to utilize a second standard lamp 55 which projects through the negative directly on the photo-electric cell. This lamp and the printing lamp 50 are preferably in the same circuit indicated by the numeral 56 so that any fluctuation in one lamp due to changes of voltage gives a fluctuation in the other lamp and hence indicating not only the relative amount of light passing through the negative, but as the negative is running substantially uniform, the fluctuation in the lamps.

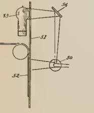
The circuit of Fig. 8 is substantially the same as that of Fig. 3 and hence need not be described in detail, and operating a relay for control purposes.

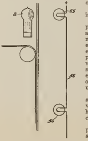
The manner of using my cino-spectrometer in printing is substantially as follows:

In the installation of Fig. 6, the printing lamp would preferably be kept at a constant voltage and thus project a more or less uniform quantity of light through the negative and reflected from the mirror 54 on the photo-electric cell. As the film changes in density this is recorded on the meter and as the printing lamps are generally provided with an iris type of light opening, this may be varied to either increase or decrease the amount of light shining through the negative on to the positive film or else the voltage of the light may be changed to increase or decrease same. These features are intended to be manually controlled or automatically controlled.

Moreover, by means of a table or chart prepared in accordance with the meter readings, the iris and the voltage of light may be set to give the desired printing as has been ascertained by prior experiment and the empirical tables or charts.

In Fig. 9 I show a mounting on my cino-spectrometer particularly suitable for reading the reflected light from a theatre screen. The light from a projector would be





thrown on the screen preferably without the interposition of a film and a reading obtained. These readings vary greatly in different theatres in accordance with the type of screen used indicating the reflective power and hence to a certain extent the degree in which a picture will be visible thereon. Therefore by means of suitably prepared tables the voltage of light from the projector may be changed in order to give the proper light.

Another procedure is to project the light through a film and then read the reflected quantity of light and by means of a suitable definition of projector light value accompanying the film adjust the projecting lamp to correspond.

By obtaining the reflective value of screens in theatres and by testing films for projection to obtain their transparency value it will be possible to standardize the films to a greater extent than is now the case as when a film is released a specification will accompany same stating the power of lamp required for different distances of projection and the type of screen required to give reasonably standard effects.

In describing the manner of using my cino-spectrometer in taking photographs I have referred to a manual control of the iris, however, it will be a relatively simple matter to control the iris automatically and instead of using a meter an electric relay could be utilized. This relay through electrical mechanism opening and closing the iris in accordance with the change in light values of the scene being taken.

It will be apparent that my cino-spectrometer may be used for a great many features in the moving picture industry such as in trick photography, double exposure, photographing through glass screens or the like. Moreover, it has been found that paints are required to be matched and that this is a difficult operation on account of the different photographic effects of apparently somewhat similar colors Therefore with the cino-spectrometer I can obtain practically duplicate paints for different scenes at different times and different plates.

In describing the printing of pictures I show a method of obtaining readings to determine the transparency value of the negative and show how the printing lamp could be varied to give substantially standard positives from a varying negative. This can also be arranged to be done automatically by utilizing a relay instead of the meter and changing the voltage of the lamp in accordance with the changing intensities of light required. Also the iris of the printing machine may be varied automatically in accordance with the changing conditions of the negative.

The cino-spectrometer would therefore find uses in testing the actinic value of different lamps or where arc lamps are used for testing the proper arc to obtain the best value for photographic purposes or for projecting pictures. Generally it may be stated that the cino-spectrometer may be utilized for testing light from a direct source or reflected or transmitted through such material as a film or the like.

It is believed from the above that many other uses of my cino-spectrometer will be apparent both connected with the motion picture industry and in other lines. Such changes in adaptation of my invention will be within the spirit thereof as set forth in the description drawings and claims.

It is to be understood that where the photo-electric cell is used in connection with a camera, that it may be positioned to receive the light which falls on some surface on which the camera lens would form an image, whether this be on a ground glass, translucent material, a reflecting surface or transparent material.

By substitution of an electric relay for the meter 35, a camera iris may be automatically controlled, the iris being operated by suitable electrical mechanism. Also where electric motor driven cameras are utilized the operation of the camera may be controlled by such a relay.

It will also be understood that the lamps 50 and 55 of Fig. 7 may be arranged in series as illustrated, or parallel. The printing lamp is controlled by the indication of the effected light on the photo-electric cell from the lamp 55.

Having described my invention, what I claim is.

1. In the method of taking photographs comprising determining the photographic value of light by a photo-electric cell, and regulating a camera in accordance with such determination.

2. In the method of taking motion pictures, focusing the light from the scene to be depicted on a photo-electric cell, determining by electrical means the photographic value of such light, and operating a camera in accordance with such determination.

3. In the method of taking motion pictures comprising focusing a camera on the scene to be photographed by means of the same lens, focusing the scene on a photo-electric cell and determining the photographic value of light from the scene and operating the camera in accordance with such determination.

4. In the method of taking motion pictures, focusing a camera on a scene to be depicted through a certain lens, transposing said lens and focusing the scene on a photo-electric cell, determining by electrical means a reading of the light value from said scene, and regulating the iris of the camera in accordance with such determination in photographing the scene.

5. In the method of taking motion pictures, focusing a scene in a camera by a certain lens, transposing said lens to a parallel position and focusing the scene on a photo-electric cell, obtaining a graphic automatic reading by the aid of electrical apparatus indicating the light value of the scene, from a spectral value or quantitive or qualitive condition, transposing the lens to a photographic position and controlling the iris and shutter otherwise operating the camera in accordance with such light determination.

6. In making motion pictures, the method comprising the steps of determining the photographic value of a scene to be photographed by a photo-electric cell, operating a camera in accordance with such determination, recording the data of the light value and the exposure and developing a film in accordance with such determination and such record.

7. In making motion pictures, the method having the steps of focusing a scene through a lens, shifting said lens, determining the light value of the scene through the lens on a photo-electric cell, determining such light value and operating a camera accordingly, recording the data of light determination and camera operation and developing a film accordingly.

8. In the method of claim 6, in addition determining the transparency value of a negative by a photo-electric cell. and operating a printing machine in accordance with such determination.

9. In the method of claim 7, in addition transmitting light through a negative developed on to a photo-electric cell, determining electrically the value of the light transmitted and controlling the operation of a printing machine transmitting light through the negative on to a positive film in accordance with such determination.

10. In the method of making pictures, transmitting light through a negative on to a photo-electric cell, determining by electrical readings the photographic value of the light transmitted and operating a printing machine

Continued on Page 40

Quick-Set Bead Screen Latest Arrow Screen Development

The Arrow Screen Company announces that it expects to score a bullseye with its new Quick-set Bead Screen. This is the latest development of this firm and consists of a device contained in a well-finished wood cabinet which is easily and quickly adjusted to hold the bead screen taut and free from sag or wrinkles during projection. The screen support is not visible from front, and when collapsed all is in a handy carrying case. Six different sized screens are available.

The company also announces the opening of a Chicago office at 109 Wabash Avenue, with John M. Mertz in charge. The New York offices are now located at 6-8 East 46th street, with H. S. Millar in charge.

Game in the Gobi

Continued from Page 25

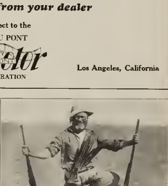
was only one way to bag our quarry. We must outflank them. At least never bar the path to their lair, for they stampede at the least alarm, and to be in their path would mean death. Calling my safari together by signs and signals, we drew off some distance and for the next two hours planned the attack.

There was much discussion, but I finally decided to throw all caution to the winds and bag the king of that herd or die in the attempt. Notwithstanding the entreaties of my men, I decided to go on alone, and it was with reluctant hands that they strapped on my trusty weapons.

I had determined not to be caught unprepared, so went fully armed. I went prepared for any emergency, be it an attack from a distance or a hand to hand combat, and it was well that I did, for when that stampede broke I was the subject of a thousand thrills and chills.

Retracing my steps to the hilltop, I again spotted the king of the herd and set about planning a course of action. The old master stood there proudly tossing his head in the breeze, little knowing what was in store for him. I approached the herd at right angles and selecting a large rock that offered protection from all sides I decided to lie there until the herd reached such a position that, when alarmed, they would pass me within shooting range.

Making myself comfortable I chose the weapon with which I had hoped to bring down one of these beasts. I had timed everything to a nicety and had just pulled a beautiful shaft from my quiver and drawn it taut across the bow when the herd got down wind and charged. Straight for their caverns they thundered and true to tradition the old king of the herd was bringing up the rear in protection of the weaker ones.



The Author proudly poses with the carcass of the terrible Jerboa he has slain

The herd roared past and the old male came on nearer and nearer to his doom. I pulled up my trusty bow and arched my back in a powerful draw. Looking along the shaft I saw the herd pass and the old bull coming on. Leading him slightly I loosed a shaft well sped. A glint of the arrow and the gleam of the broadhead as it cleft the air—the old fellow stopped in his tracks, wavered a moment, and, faw down. The shaft zipped through the air a good two feet over him. Astounded, I leapt to my feet and ran to where he lay—and what do you think I found? He had stepped into a mouse trap set out by one of the natives the night before.

And so ended my hunt for the famed Jerboa.

*L*IGHTING THE *H*OME *S*ET

An Expert on Amateur Lighting Gives Some Pertinent Advice On This Question That Means So Much To Good Picture Making.

By VAL J. ROPER
Engineering Department, National Lamp Works of G. E. Co

VAL J. ROPER

TO THE eager new owner of the amateur movie outfit almost any pictures of the family, friends, or self, that move and are recognizable, are pleasing. His first few shots are not ordinarily planned, but are taken spontaneously of whatever subject matter presents itself. He is thrilled, and proud, to see his dear ones, or his friends in movies that he made.

After the first roll or two of film is consumed in this manner—after the "novelty has worn off"—he begins to cast about for especially interesting subject matter which, when reproduced, will not be boresome to even chance acquaintances. He begins to plan his shots and guard his footage—he has a reason for each shot. He often goes to the extent of planning home scenarios, becoming playwright, producer, and director as well as cameraman, scene shifter, electrician, editor and projectionist. It's real sport, this home movie game, teeming with interest and abounding with untold possibilities.

Many of the most interesting and most desirable shots can only be made indoors, or at night; these of course necessitate the use of artificial lighting equipment. This necessity may seem almost prohibitory at first thought, for at some time or other each of us has read about or seen pictures of the elaborate set-up of powerful lights used for illuminating the professional motion picture set. For instance, witness the pictures of the Broadway set, appearing in the March issue of the American Cinematographer. However, while the fundamental principles underlying the lighting of the large movie sets apply to the amateur set as well, the amateur's requirements are really much more modest; he will find that convenient and adequate lighting equipment is available for his use, and at no great expense.

Before going into the selection of properly designed equipment, let us consider briefly the lighting requirements. First of all, there must be enough illumination on the entire subject to sufficiently expose the negative.

The amount of this intensity varies with the lens speed, but it is hardly advisable to attempt shooting movies under artificial lighting at slower speeds than F 3.5. Just light—plain, flat light—on the subject isn't enough. The subject, and the scene, must be modelled with light—modelled to give form, life, and action. Modelling is effected through the proper placing and control of highlights and shadows. The accompanying illustration of Laocoon's head lighted three different ways (Figure No. 1) gives a picture story better than any word story of the difference between flat lighting, lighting to give desirable contrasts, and lighting to give harsh contrasts. Light is poured upon the face at the left equally from all directions—the result is very flat, with complete loss of detail. The middle head is illuminated chiefly by light coming from the upper left, but there is enough light on the darker side of the face to round out the shadows and keep them from being too harsh. In the case of the head on the right, all of the light is coming from the one side, producing very harsh shadows and again resulting in an unnatural effect and loss of detail, qualities which will on occasion be wanted to express a particular feeling. The degree of modelling attained with the middle face is that ordinarily required. Usually, then, we need directional light, and the majority of the light on the subject from one direction, but enough diffused light all over the subject to expose the negative.

In the professional studio, the diffuse illumination is known as general lighting and is obtained by directing

a flood of diffused light over the entire set from a group of so-called broadside or general lighting units. These alone produce flat lighting, giving no form to the set and emphasizinfg nothing. The modelling lighting is piled on top of this general illumination—large parabolic mirror spotlights using very high wattage lamps give the light control necessary to produce contrasts, model the subjects, give emphasis to certain parts and simulate certain natural effects such as sunlight streaming through a window.

Since the home sets are naturally much smaller than the professional ones, and since it is not strictly imperative that the home movie be technically perfect, the professional types of lighting equipments are not necessary. Furthermore, they are too costly and too large physically to be conveniently handled in the home by the amateur. Amateur lighting equipment should be fairly compact, reasonably priced, convenient and safe, and it is usually necessary to limit the number of units to two or three to insure against overloading the house wiring circuits. Therefore, it is imperative that the amateur equipments be highly efficient as light producers, and in placing the light just where it is wanted. Efficiency of light utilization is even more important with the non-professional equipments than with professional. Fortunately it has been found possible, with a light source such as the higher wattage incandescent filament, to design efficient reflecting units which answer the amateur's needs. Each owner of a home movie outfit should possess at least one or two of these well designed lighting units (Figure No. 2). They may be pooled by the local movie club to provide sufficient lighting equipment for filming interior scenarios on a larger scale.

It is possible to obtain an acceptable compromise for both general and modelling illumination from one type of unit. The contour of such a reflector is so designed that it diffuses some light over a limited area, but has a "hot" spot in the center which may be directed at the part to be emphasized. The surrounding diffused spread illuminates the background, or supporting action. Then by means of reflecting screens, or a similar unit placed at a greater distance, the deep shadows produced by the "hot" spot of the unit furnishing the main directional light may be filled in to give the desirable contrasts.

Fig 2

Lighting units giving a wide, diffused spread of light are ordinarily not satisfactory for amateur motion picture photography. These scatter the light over too large an area, at a resulting low intensity. Fortunately, because of the smaller sets encountered in the home, the spread, or area covered by the individual reflector, may be small. Reflector design limiting the light to a narrow spread effects higher intensity of illumination over the useful areas. Such reflectors are of parabolic, or modified parabolic contour, and usually have semi-matte finished surfaces to obtain beams without striations, or streaks. However, specially designed polished surface reflectors may produce the same results, with possibility of higher efficiency.

The diameter, as well as the contour, of the reflector determines the amount of light picked up from the source and redirected to the useful areas. For a given reflector design—say a paraboloid—twice the reflector area gives, roughly, twice the candlepower. This is because each minute section of the reflector surface reflects an image of the light source; the more surface, the greater the number of reflected images, and hence the higher the candlepower. The desirability of compactness, and portability of amateur equipment limit the diameter. However, as mentioned previously, since the total wattage possible to employ on house circuits is limited, and since very high intensities of illumination (compared to the usual lighting levels in the house) are necessary, it

is advisable, especially in shooting action covering, say the entire end of a room, to employ large diameter units. A word of caution here—large diameter alone does not necessarily infer high efficiency of light utilization. It is first essential that the contour be such that it redirects the light within a relatively small angle—an angle about thirty to forty degrees.

There are a number of well designed equipments on the market—Figure No. 2 shows two general types of equipments giving the proper light distribution. The smaller of the two has the feature of compactness, and with a 1000-watt projector lamp gives a maximum of about 20,000 candlepower. The larger, while it is light in weight and very portable, is not so compact, but with a 1000-watt general lighting service lamp gives about 35,000 candlepower, and with the same lamp operated about 10 per cent over-voltage (105-volt lamp on 115-volt circuit) it gives a maximum of about 50,000 candlepower.

Table I shows the minimum foot-candle intensities necessary to taking motion pictures at the normal speed for different lens speeds; the distance at which both the smaller and the larger diameter equipments illustrated in Figure No. 2 must be placed from the object or subject photographed to give this minimum foot-candle intensity; and the lighted area covered by the units at this distance. A table of this type might be used to determine the number of these units required for lighting a set of any given size. Intensities of illumination several times those shown in the table may be employed without over-exposing the film, and it is desirable to use higher intensities than those indicated, on the parts of the set, or the action, to be emphasized.

For obtaining marked highlights, contrasts, and special effects, a lens type spotlight (Figure No. 3) is to be recommended. With this it is possible to obtain either a very narrow beam of light of high intensity, or varying spreads of lower intensities. One or two of the efficient reflector units, in conjunction with a good lens spotlight using a 500 or 1000-unit incandescent spotlight lamp, gives the amateur movie photographer equipment that is ample to suit almost all of his lighting requirements.

Perhaps it would be well at this point to enter another word of caution about the danger of overloading the house wiring circuit. It will often be found that the fusing is not sufficient to carry even the safe load. Therefore, to obviate the annoyance of blowing fuses, it is best to see that a 15-ampere fuse is installed in each circuit to which the movie lighting reflectors are to be attached. Don't, by any means, short around the fuses, for these are protective devices that are absolutely necessary for insurance against fire. If more than one unit is used, each should be connected to a separate branch circuit, and if it is necessary to run an extension cord across the room or into another room, heavier wire than the ordinary lamp cord should be used—this should be No. 12 or 14 at least. A 1000-watt lamp should not be connected to a floor, bridge, or table lamp, for the wiring devices used on these are not designed to carry the comparatively heavy current taken by a lamp of this size. Of course these units are used only for very short periods of time, and hence higher currents may be safely drawn through these wiring devices than in the case of continuous operation. Another good rule to observe is to never have a high wattage appliance, or lights

Fig 4

all over the house, in operation at the same time the movie lighting equipments are being used.

For best illumination results, it is advisable to use lamps which have a voltage rating at least five volts lower than that of the general house lighting lamps which you use. The reason for this is the fact that the heavier load of these high wattage units causes a material voltage drop in the house wiring. The voltage at the lamps when the movie lighting units are in operation may be expected to be at least five volts under the value normally encountered. Hence if the house circuit voltage is normally 115 volts, 110 or 105-volt lamps should be used.* The projector (tubular bulb) type of lamps commonly used in the compact type of amateur equipments are especially designed to give a maximum light output for their wattage; however, the general lighting service type of lamps (pear-shaped bulb) used in the larger diameter equipment, illustrated in Figure No. 2, are designed for services not requiring these high intensities and hence have a lower efficiency. For best results in making motion pictures, this type of lamp should be

TABLE I

		Small Diameter Unit—Fig 2 (1000-watt Projector Lamp)		Large Diameter Unit—Fig 2 (1000 Watt General Lighting Service Lamp) **100% Volts		**110% Volts	
Lens Speed	*Minimum Foot-Candle Intensity	Distance of Unit from Subject	Diameter of Useful Lighted Spot at This Distance	Distance of Unit from Subject	Diameter of Useful Lighted Spot at This Distance	Distance of Unit from Subject	Diameter of Useful Lighted Spot at This Distance
1 5	85	13′ 4″	7′ 7″	16′ 7″	10′ 5″	19′ 6″	12′ 4″
1.8	123	11′ 1″	6′ 3″	13′ 9″	8′ 8″	16′ 3″	10′ 3″
1.9	137	10′ 6″	5′ 11″	13′ 0″	8′ 3″	15′ 4″	9′ 8″
2.3	200	8′ 8″	4′ 11″	10′ 10″	6′ 10″	12′ 9″	8′ 0″
3 5	460	5′ 9″	3′ 3″	7′ 1″	4′ 6″	8′ 5″	5′ 4″

*The foot-candle is the standard unit of intensity of illumination. At noon on a bright summer day the illumination intensity measures 8 000-10 0000 foot-candles Stores and offices have usually been considered well lighted when the intensity is 10-15 foot-candles

**100% Volts means circuit voltage same as lamp voltage 110% Volts means circuit voltage 10% higher than lamp voltage

over-volted about 10 per cent. That is, the labelled voltage of the lamps should be 10 volts lower than the voltage at the sockets when the lamps are turned on.

It was stated previously that the physical properties of the incandescent lamp permit efficient reflector design. The incandescent lamp has other advantages which make it a most desirable source of illumination in taking home movies, as well as for lighting the larger sets of the professional studio. It is most convenient—may be turned off and on at will by a switch; it emits light of constant quantity and quality; it emits no chemical or ultra-violet rays, and hence the subjects cannot experience "Kleig eye." It requires no attention during operation, an important factor with the amateur. Furthermore, its use is especially desirable with panchromatic film—color reproduction is then obtained without the use of any filters. The incandescent filament emits light of all colors, and enough of a preponderance of red and yellow to counteract the lesser sensitivity of the panchromatic film to those colors. When arcs are used as the light source in connection with panchromatic film, the so-called panchromatic carbons should be employed, otherwise the advantages of the panchromatic film are nullified.

The home movie has assumed important proportions in our amusement life—it is gradually taking a place in our homes alongside of the radio. Its scope is increased tremendously when outdoor shots are supplemented by the many intimate scenes which may only be taken indoors, through the use of artificial lighting equipment.

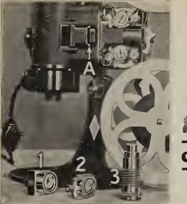
*If possible it would be well to check the voltage at the socket with the lamps turned on using a reliable voltmeter. A good way to check the voltage before the lamps are first obtained, is to use a high wattage appliance, such as a heater, and measure the voltage at the socket both with the heater on and off. The difference or voltage drop is proportional to the current drawn. Hence, if the heater consumes 660 watts, or 6 amperes, the voltage drop were a 1000-watt lamp used in its place would be 10/6 as much since the 1000-watt lamp takes approximately 10 amperes. If two lamps were used on the same circuit, the voltage drop would be doubled.

Professor Baker Calls Talkies Great Invention

Motion pictures have been a great help to speech in the drama, and the "talkies" are the beginning of a great invention, Dr. George Pierce Baker, professor of drama at Yale University, told the American Academy of Arts and Letters in New York recently.

"I believe the motion picture of the last twenty years has helped speech in the drama," he said. "Now we are faced with that so-called art-form, the 'talkies' or 'speakies,' titles which in their infantile diminutives suggest their age. Here, however, is the beginning of a great invention. As yet those who are working with it admit to me that they do not fully understand its possibilities."

Dr. Baker predicted that drama in the future will be more compact and that more perfect dramatic scenes will be achieved. Dramatists have been compelled to separate themselves more and more from melodrama and to turn to intimate, delicate characterization.



Filmo 57-G Projector for Kodacolor showing (A) opening for auxiliary condenser. In foreground (1) 45-50 condenser, (2) auxiliary condenser and (3) Kodacolor projection lens

New Projector for Kodacolor Films Announced by Bell & Howell

A new FILMO Projector model, known as the FILMO 57-G Kodacolor Equipped Projector, has been developed by the Bell & Howell Company, and is now on the market. This machine, it is claimed, embodies a highly improved Kodacolor optical system, and provides the best obtainable results when projecting the beautiful films which may be made by the Kodacolor process.

The FILMO 57-G Projector differs from previous Kodacolor equipped FILMO models in that it has a new special Kodacolor projection lens assembly and an auxiliary condenser. The new lens attains the ultimate degree of color correction for Kodacolor. The auxiliary condenser is located between the regular condenser and the projection lens. Its purpose is to direct the light rays through the Kodacolor film at the same angle at which they meet the film in the camera. This is a highly important part of the optical system, as the tiny lenses on the Kodacolor film can properly play their part in projection only when the photographing optical conditions are accurately reproduced in the projecting optical system.

The FILMO 57-G Projector, in addition to being equipped with the new Kodacolor lens assembly and auxiliary condenser, has the 250-Watt, 5-ampere lamp, 45-50 condenser, and the variable voltage resistence and voltmeter units, thus providing powerful illumination which contributes materially to the beauty of Kodacolor pictures. The regular 2-inch lens and a dummy auxiliary condenser, completing the 57-G Projector for black and white work, are also included.

Previously purchased FILMO Projectors, according to information received from the manufacturer, may be equipped with the new Kodacolor projection lens assembly merely by inserting this assembly in place of the regular lens. To have the auxiliary condenser installed, previously purchased machines must be sent to the Bell & Howell factory. It is advised that this be done, because the new combination provides the ideal optical system for Kodacolor projection. However, FILMO Projector owners who do not wish to have their machines adapted for the new auxiliary condenser can use the former FILMO Kodacolor projection lens assembly.

JUGO SLAVIA

The greatest competitors of the American feature pictures are the films now being produced by the U.F.A. Company, the activities of which cover a great range of subjects. It is believed that during 1929 American films will have quite extensive competition from the U.F.A. films.

Predicts Cino-Spectrometer Will Eliminate Errors

Continued from Page 33

transmitting light through the negative on to a positive to print a positive.

11. In the method of making motion pictures, transmitting light through a moving negative on to a photo-electric cell, determining by electrical factors the photographic light value transmitted and regulating a printing machine having a source of light transmitted through the negative on to a moving positive to obtain a positive film.

12. In the method of claim 11, in which the voltage of the lamp is regulated in accordance with the determination of the light value.

13. In the method of making and using motion pictures, comprising utilizing a photo-electric cell to determine the light value of a scene to be photographed, operating a camera in accordance with such determination, developing a negative, transmitting light through the negative on to a photo-electric cell, determining the photographic value of the light transmitted, operating a printing machine in accordance with such latter determination, utilizing a photo-electric cell to obtain the transmission value of a positive and establishing data of the value of the projected light and screen to be used in projecting the picture.

14. In the method of claim 13, in addition by means of a photo-electric cell obtaining the photographic value of a projector lamp to be used in projecting througb a positive.

15. In the method of claim 13, transmitting reflected ligbt from a projector on a screen on a photo-electric cell and determining the photographic value of the projected and reflected light.

16. In the method of claim 13, in addition projecting light from a projector lamp through a positive on to a screen, transmitting the reflected light from the screen on a photo-electric cell, determining the value of such light and regulating the projector lamp in accordance with such determination.

17. A step in the method of projecting pictures, comprising projecting a light on a screen, focusing through lenses some of the light from the screen on a photo-electric cell and by electrical factors obtaining a determination of the reflected light in accordance with changes in the projecting lamp and the screen.

18. In a cino-spectrometer, a lens, a photo-electric cell focusing light on the cell, sources of electric power for the cell and for amplifying the current therefrom and a recording instrument to record the electrical values from which may be interpreted the light values on the cell.

19. In a cino-spectrometer, a camera having a lens, a photo-electric cell amounted on the camera, positioned to receive light through the said lens, sources of electric power for the cell and for amplification of the current therethrough, and means to record such electric current.

20. In a cine-spectrometer, a camera having a transposable lens adapted in one position to photograph on a film, a photo-electric cell positioned to receive focused light through the lens in another position, sources of

electric power for the cell and for amplifying the current therethrough, and means to register the current through the cell

21. In a cino-spectrometer, a camera having a rotatable turret mounted on a magazine with a plurality of lenses, said lenses being adapted to photograph on a film in the magazine, a photo-electric cell positioned adjacent the magazine and adapted to receive light focused through any of the lenses, sources of electric power for the cell and an amplified current therethrough, and means to register the said current.

22 In a cino-spectrometer as claimed in claim 21, in which the means to register the current comprises an automatic recording thereof.

23. In a photographic printing machine having a source of light, means for projecting said light through a negative on to a positive, a cino-spectrometer having a photo-electric cell positioned to receive light through the negative, sources of power for the cell and for amplified current therethrough, and means to register said current

24 In a photographic printing machine having a projecting lamp and means for moving a negative and positive film to be printed with the light projecting through the negative on to the positive, a cino-spectrometer having a photo-electric cell positioned to receive light through the negative sources of electric power for the cell and for the amplified current therethrough, and means to register the said current

25. A method in the art described, comprising the step of passing light through a film, receiving said light on a photo-electric surface and controlling light values in an auxiliary step in accordance with the indication of the electric current effected by such light through the film on the photo-electric surface.

Complete Sound Stages

Frank Dexter, technical director for Darmour-RKO, has completed the erection and sound proofing of the company's talkie stages at the Hollywood studio.

Characteristics of Motion Picture Studio Light Sources

Continued from Page 15

brightness. A proper combination of the neon and mercury vapor lights should therefore produce a much better rendition of colored objects than either one of the two separately.

10. **One 50-inch mercury vapor U-tube in white enameled reflector.**
11. **Three mercury vapor U-tubes plus one neon tube.**
12. **Two mercury vapor U-tubes plus one neon tube.**
13. **One mercury vapor U-tube plus one neon tube.**
14. **One neon tube.**
15. **One straight 50-inch mercury vapor tube in standard reflector.**

Incandescent tungsten lamps. The units used were 3000-watt (115-volt) gas-filled lamps manufactured by the Edison Lamp Works, Harrison, N. J. The flood light units referred to below consisted of the polygonal mirror reflectors previously described,[5] equipped with these 3000-watt Mazda lamps. These units were operated at voltages varying from 70 to 128. The data relative to the luminous efficiency were obtained largely from a publication by Luckiesh, Holladay, and Taylor.[6] From the values of photographic efficiency obtained it was possible to plot a curve showing the relation between photographic efficiency and color temperature. This makes it possible to determine the photographic efficiency for a tungsten lamp operating at any specified color temperature

16. **3000-watt tungsten lamp at 70 volts.**
17. **3000-watt tungsten lamp at 90 volts.**
18. **3000-watt tungsten lamp at 105 volts.**
19. **3000-watt tungsten lamp at 110 volts.**
20. **3000-watt tungsten lamp at 115 volts.**
21. **3000-watt tungsten lamp at 128 volts.**
22. **900-watt motion picture projection lamp.**
23. **10,000-watt tungsten spot light.** This unit consisted of a 10-kw. tungsten lamp of the ribbon filament type mounted in front of the 30-inch parabolic reflector made by the Bausch & Lomb Optical Company. A photograph of this unit is shown in Fig. 3.
24. **2000-watt tungsten spot light.** This unit is indentical with 23, except that the 10-kw. lamp is replaced by a 2000-watt (110-volt) monoplane filament tungsten lamp.

Experimental Results

The experimental results obtained are shown in Tables II and II-A. In Table II are all of the data relating to the various forms of arc lamps and gaseous conductor lamps. In the first section are tabulated the values of **line current** and **line voltage**, from which are computed the values of the **total wattage** appearing in the second section of the table under the general title "Total." The values of total lumens shown in this table for the flame arcs were kindly furnished by Mr. Downes of the National Carbon Company. By dividing the total lumens by total watts the over-all efficiency of the unit as a light generating device is obtained. These are shown in the column "L/W." It is obvious that all of the luminous flux generated can not be used effectively in illuminating the set. The amount used will depend on many factors, such as the shape and reflecting power of the arc housing. In the section of the table under the general title "Effective" are tabulated values which represent approximately the useful light flux obtainable from the Creco broadside unit when trimmed with the various flame carbons. It is quite impossible to make any rigorous determination of this value owing to the varied conditions existing in the studio It seems reasonable to consider that the total luminous flux leaving the unit within a cone having a half angle of 60° represents a fair assumption of average practical utility. Therefore, measurements were made of the total luminous flux emitted within this solid angle, and from these the values of effective luminous efficiency (L/W) were computed. In the last section of the table under the general heading "Photic Efficiency" are shown the results of the photographic measurements. For convenience these are given in somewhat different forms. The symbols used as column headings may be defined as follows.

E_m is the value of exposure incident on the photographic material (expressed in foot candle seconds) which, when the material is developed to normal contrast (γ=0.8), will give a density which lies on the characteristic curve of the material at the point where the slope of this characteristic curve has a value of 0.2. As stated previously, it is assumed that this slope represents the minimum useful gradient. Hence the value of E_m represents the minimum exposure which is useful in the rendition of shadow detail, and from the magnitude of E_m it is possible to compute the brightness of the darkest portion in the set

Table II

No.	Source	Line Amps.	Line Volts	Arc Volts	Watts	Total Lumens	Total L/W	Effective Lumens	Effective L/W	Photic Efficiency E_m	Photic Efficiency E_x	Photic Efficiency U_v
1	Sunlight	--	--	--	--	--	--	--	--	0.004	50	100%
2	White Flame	38	110	78	4070	150,000	38	45,000	12	.009	115	43
3	Pearl Flame	38	110	76	4070	220,000	54	66,000	16	.011	140	36
4	Yellow Flame	38	110	78	4070	250,000	61	75,000	18	.015	190	26
5	Orange Flame	40	110	72	4400	190,000	43	57,000	13	.014	175	29
6	Rad Flama	44	110	72	4840	120,000	25	36,000	8	.008	118	46
7	High Intensity	78	110	60	8600	--	--	25,800	3	.005	60	83
8	High Intensity	150	110	80	16500	--	--	209,000	13	.005	60	83
9	Low Intensity	83	110	65	9100		--	18,200	2	.008	100	50
10	1 Hg.	5.4	110	--	510*	--	17.9	4,600	9.0	.012	150	33
11	3 hg. + 1 Ne.	23.3	110	--	2180*	--	--	16,300	7.5	.016	210	24
12	2 Hg. + 1 Ne.	17.9	110	--	1670*	0-	--	11,800	7.0	.022	280	20
13	1 Hg. + 1 Ne.	12.5	110	--	1160*	--	--	7,130	6.1	.026	335	15
14	1 Ne.	7.1	110	--	660*	--	--	2,180	3.3	.033	425	12
15	1 Hg.	3.8	110	--	430	7,700	17.9	3,100	7.2	.012	150	33

* Power Factor 0.85

which will give sufficient exposure for the rendition of shadow detail in that darkest portion.

E_x is computed directly from E_m and is intended to give a more definite idea of the illumination required when using the various light sources. The values shown in this column are those of the illumination on a black object, having a reflecting power of 2 per cent, required to render this black object at a point on the characteristic curve where its slope is 0.2, when photographed by means of a lens operating at f/2.3, at standard taking speed of 16 pictures per second and with the motion picture camera shutter set at an angular opening of 170°.

U_v designates the **relative photographic efficiency.** These values are computed assuming an efficiency of 100 per cent for mean noon sunlight. It should be kept in mind that these values are expressed in terms of visual units and are proportional to the photographic effect resulting from the action of equal exposures (foot-candle seconds) to light from the different sources.

The high intensity arc shown as No. 7 in **Table II** is a spot light unit using a condenser lens as a means of concentrating the light flux on the object. The low value of effective luminous efficiency, that is 3 lumens per watt, is due to the relatively low light-gathering power of the optical system. There is little doubt that a spot light using the high intensity arc could be constructed which would give much higher effective luminous efficiencies. This end could probably be accomplished by a suitable combination of mirrors and lenses similar to those used in the high intensity motion picture projector arc.

Unit No. 8 is the high intensity "sun arc" which is used for flood light purposes combining a high intensity arc mechanism with a paraholic reflector. The values of electrical and luminous efficiencies were not determined in this laboratory but were taken from a publication by Mr. Benford (**loc. cit.**). With respect to photographic efficiency, in terms of visual units, the light emitted by this unit is equivalent to that of the high intensity spot shown as unit No. 7.

Unit No. 9 is the ordinary form of low intensity arc spot. Here again the low luminous efficiency is due to the optical system used in concentrating the light beam.

Units 10 to 14 include the gaseous conductor lamps which were studied in this laboratory. Since no integrating sphere of sufficient dimensions was available, it was impossible to determine their total luminous efficiencies. Their effective luminous efficiencies, however, are based upon the radiations emitted within a cone having a half angle of 60° and are thus comparable with the other effective luminous efficiency values computed in a similar manner. It will be noted that the mercury vapor source alone has a relatively high luminous efficiency, while the neon by itself is relatively low, being only 2.8 lumens per watt available within the 120° solid angle. The photographic efficiencies, U_v, as measured on panchromatic film follow in general the same arrangement.

In case of the unit designated as 15 in the table the values are taken directly from data published relative to the standard 50-inch mercury vapor tube mounted in the reflector quite universally used in motion picture studios.[7]

In Table II-A are shown the data relative to incandescent tungsten lamps. Items 16 to 21, inclusive, refer to a 3000-watt, gas-filled lamp mounted in the polyhedral mirror reflector previously described.[5] In the column designated as "T_c" are shown the values of color temperature for the lamp operated at the indicated voltages. The reflector referred to was designed specifically for flood lighting, but the reflected luminous flux is confined almost entirely within a cone having a half angle of 45°. The values of effective luminous efficiency are computed for a spread of this magnitude. The results are therefore not quite comparable with those shown for the arcs and gaseous conductor lamps, the illumination in the case of the tungsten lamp in its reflector being confined to a somewhat narrower angle. Values in the section designated as **photic efficiencies** show the way in which this factor increases as the lamp is operated at higher and higher temperatures.

The 3000-watt lamp referred to above is not designated for operating at temperatures exceeding 3100°K (color temperature). In order to show that some increase in photographic efficiency can be obtained by raising the temperature still higher the data for unit No. 22 are given. This is the 900-watt monoplane filament lamp designated for motion picture projection service. This operates at a color temperature of 3220°K, and as shown in the last section of the table, its photic efficiency is somewhat higher. No values for the effective efficiency of this unit have been determined.

The spot light unit No. 23 has an effective luminous efficiency of 7.5 lumens per watt. Its photic efficiency of course is the same as any tungsten lamp operating at the same color temperature. The 2000-watt monoplane filament lamp used with the same reflector gives a somewhat higher effective luminous efficiency, this being due to the smaller actual size of the filament assembly. These measurements of effective luminous efficiency were made with an adjustment of the lamp giving an illuminated spot 3½ feet in diameter.

Efficiency for Rendition of Colored Objects

The data thus far given (Tables II and II-A) refer entirely to the photographic efficiency of the source under conditions where the light is unmodified by selective absorption. While this factor is of considerable interest in studio technique, it is probably of minor importance as compared with the quality factor, since the correct rendition of colored objects on the tonal scale depends upon the spectral composition and not upon actual intensity. In order to obtain some information regarding the relative characteristics of various light sources of the correct orthochromatic reproduction of colored objects, a series of color panels was photographed along with the gray scale chart already described. The method of preparing these color panels has been described in a previous communication.[8] The method followed for the determination of photographic reflecting power is identical

Table 2a

No.	Source	Line Amps	Line Volts	T_c	Total			Effective		Photic Efficiency		
					Watts	Lumens	L/W	Lumens	L/W	E_m	E_x	U_v
16	Tungsten	19.2	70	2450	1350	10,800	8	6,050	4.5	0.036	460	10.9%
17	"	22.3	90	2680	2000	26,000	13	14,500	7.3	0.033	425	11.8
18	"	24.6	105	2850	2580	45,000	17.5	25,200	9.8	0.031	400	12.5
19	"	25.4	110	2900	2800	55,000	19.5	30,700	10.9	0.030	388	12.9
20	"	26.1	115	2950	3000	63,000	21.0	35,200	11.8	0.029	382	13.1
21	"	27.8	128	3100	3560	89,000	25.0	49,800	14.	0.028	365	13.7
22	"	30.	30	3220	900	2,350	26.2	--	--	0.027	350	14.3
23	"	91.	110	3175	10000	255,000	25.5	75,000	7.5	0.028	365	13.7
24	"	18.	110	3100	2000	50,000	25.0	16,500	8.3	0.028	365	13.7

Table 3

No.	Color	Visual R_v	Photographic Reflecting Power Hg.	3-1	2-1	1-1	Ne.	Tungsten
71	Spectrum Red	8.0	1.5	3.0	7.8	14.0	35.0	20.0
72	Vermillion	14.0	5.2	6.5	12.0	18.0	24.0	22.0
59	Vermillion Orange	22.0	6.0	8.5	14.0	28.0	43.0	28.0
58	Cadmium Orange	23.0	6.5	7.8	16.0	25.0	46.0	25.0
48	Cadmium Yellow	38.0	8.5	11.0	21.0	29.0	54.0	30.0
51	Spectrum Yellow	40.0	8.0	10.0	14.0	28.0	43.0	31.0
18	Chrome Yellow DO	23.0	7.0	7.8	15.0	25.0	35.0	25.0
18	Chrome Yellow Orange	31.0	8.0	8.8	18.0	31.0	48.0	30.0
18T	Chrome Yellow Lemon,50	51.0	13.0	15.0	22.0	35.0	48.0	35.0
107	Apple Green	38.0	12.0	14.0	17.0	28.0	35.0	25.0
109	Emerald Green	31.0	12.0	13.0	15.0	15.0	15.0	23.0
61	Cobalt Green	17.0	11.0	9.0	12.0	13.0	10.0	15.0
60J	Viridian, 50	16.0	20.0	18.0	14.0	13.0	12.0	14.0
80M	Cobalt Blue, 25	24.0	50.0	45.0	38.0	30.0	20.0	40.0
82E	Prussian Blue, 25	9.0	18.0	17.0	16.0	15.0	15.0	13.0
830	French Ultramarine,50	11.0	34.0	32.0	38.0	25.0	12.0	22.0
30	Ultramarine Blue	6.0	18.0	17.0	14.0	10.0	5.0	14.0
64	Cobalt Violet	9.0	32.0	26.0	30.0	32.0	30.0	25.0
65S	Spectrum Violet,12.5	8.5	60.0	18.0	22.0	20.0	18.0	14.0
85L	Purple Lake, 50	8.0	14.0	12.0	16.0	14.0	16.0	13.0
86	Magenta Lake	4.8	7.5	5.8	7.0	8.7	7.6	5.0
73A	Permanent Crimson,50	5.8	10.0	11.0	13.0	16.0	30.0	12.0

with that described in the communication just mentioned The color panels were photographed under the same conditions as those used in making the pictures of the gray panels. The exposed film was given exactly the same development treatment and densities were read in the usual manner. The method of obtaining the photographic reflecting power may be illustrated by reference to Fig. 1. The density obtained from an image of one of the color samples is laid off on the density scale, for instance at point B. A horizontal line through this point cuts the characteristic curve which is established from the readings made on the gray chart at the point O. A perpendicular dropped from the point O to the log exposure axis determines the point C. From this value the photographic reflecting power of the color panel in question can be computed directly. The results of this work are shown in Tables III and III-A. The colors are arranged from the top downward, beginning with red and running through the spectrum to the blue. It should be remembered of course that the pigments used reflect relatively broad spectral bands and hence the arrangement shown while representing in general a systematic progression of wave-length from red to blue, can only be considered as approximating a true spectral progression.

In Table III are given the values obtained with the gaseous conductor lamps and incandescent tungsten. The values in the column designated as "visual" are the reflecting powers of the various color panels as determined under sunlight illumination. The column headings under the general title "Photographic Reflecting Power" have the following meaning:

Hg Cooper Hewitt mercury vapor lamp.
3-1 Three mercury vapor units plus one neon unit.
2-1 Two mercury vapor units plus one neon unit.
1-1 One mercury vapor unit plus one neon unit.
Ne One neon unit.

Tungsten 3000-watt Mazda lamp operating at color temperature of 3100°K.

It will be noted that the mercury vapor gives relatively low values for the red colors and very high values for the blue end of the spectrum. It appears that the combination of the two mercury vapor tubes with one neon tube is the optimum combination from the standpoint of correct rendering of tone values. The neon unit alone gives reflecting power values for the red panels which are much higher than they should be. The tungsten illumination tends to give values too high for the red panels, but gives fairly correct orthochromatic reproduction for all others.

In Table III-A are given the results obtained with the various types of arc units, the column designations having the following meaning:

HI High intensity arc.
LI Low intensity arc.
WF White flame arc.
YF Yellow flame arc.
OF Orange flame arc.
RF Red flame arc.

It will be noted that the reflecting power values obtained with the high intensity arc are too high at the blue end of the spectrum and too low at the red end. Some improvement is obtained by using the low intensity arc, and even better results with the white flame arc.

Table 3a

No.	Color	Visual R_v	Photographic Reflecting Power H.I.	L.I.	W.F.	Y.F.	O.F.	R.F.
71	Spectrum Red	8.0	3.5	4.0	4.5	7.8	12.0	16.0
72	Vermillion	14.0	7.5	14.0	14.0	14.0	16.0	22.0
59	Vermillion Orange	22.0	11.0	12.0	13.0	17.0	25.0	30.0
58	Cadmium Orange	23.0	8.5	13.0	12.0	17.0	24.0	28.0
48	Cadmium Yellow	36.0	12.0	16.0	15.0	18.0	25.0	30.0
51	Spectrum Yellow	40.0	9.5	10.0	13.0	16.0	23.0	28.0
18	Chrome Yellow DO	24.0	10.0	13.0	12.0	14.0	21.0	25.0
18	Chrome Yellow Orange	31.0	14.0	18.0	16.0	20.0	26.0	30.0
18T	Chrome Yellow Lemon,50	51.0	16.0	18.0	20.0	20.0	29.0	30.0
107	Apple Green	36.0	15.0	19.0	16.0	19.0	24.0	28.0
109	Emerald Green	31.0	15.0	12.0	16.0	17.0	18.0	16.0
61	Cobalt Green	17.0	12.0	10.0	13.0	12.0	12.0	11.0
60J	Viridian, 50	16.0	20.0	13.0	15.0	14.	15.0	11.0
80M	Cobalt Blue, 25	24.0	50.0	39.0	45.0	39.0	40.0	35.0
82E	Prussian Blue, 25	9.0	16.0	15.0	16.0	13.0	15.0	14.0
83G	French Ultramarine,50	11.0	32.0	25.0	28.0	24.0	25.0	23.0
30	Ultramarine Blue	6.0	20.0	16.0	18.0	18.0	16.0	15.0
64	Cobalt Violet	8.0	34.0	30.0	28.0	27.0	29.0	29.0
65S	Spectrum Violet,12.5	8.5	18.0	17.0	17.0	14.0	15.0	16.0
85L	Purple Lake,50	8.0	13.0	12.0	14.0	12.0	13.0	15.0
98	Magenta Lake	4.8	6.5	4.4	4.0	4.5	6.2	6.2
73A	Permanent Crimson,50	6.8	8.2	7.8	6.0	7.8	10.0	14.0

The orange flame gives very good correction in general, although there is a tendency for the red panels to show a reflecting power higher than their visual values. The red flame arc produces considerable over-correction at the red end.

3. J. O. S. A. & R. S. I. 6: 549, (1922).
4. Trans. Soc. Mot. Pict. Eng. 24: 82, (1925).
5. **Incandescent Tungsten Lamp Installation for Illuminating Color Motion Picture Studio.** Loyd A. Jones. Trans Soc. Mot Pict. Eng. 22. 25, (1925).
6. **The Short-Wave Radiation from Tungsten Filaments.** Luckiesh, Holladay, and Taylor. J. Frank Inst. 196, 353, 495, (1923).
7. **The Cooper Hewitt Mercury Vapor Lamp.** L. J. Buttolph. Gen. Elec Rev 23: 741, (1920).
8. **The Photographic Reflecting Power of Colored Objects.** L. A Jones. Trans Soc. Mot. Pict. Eng No. 31 · 564, (1927).

RUSSIA

The Moscow factory of Svokino has opened a special branch where Proletarian authors are taught the science of scenario writing by highly qualified specialists Twenty-five authors are now being trained, most of them drawing wages from the Svokino.

Limitations of the Iron Ear

Continued from Page 12

how action before his camera must be kept within certain limited areas. The shape of the critical area around a microphone, however, is circular, with the back area, approximately two thirds of the circle, good only for limited frequency bands. That is, the area behind the microphone.

The circle is made larger, up to the limits of the sensitivity of the device, by turning a dial on the control panel. Likewise, it is made smaller. Microphones vary. Very good ones will pick up orchestral sounds within a circle thirty feet in diameter, under what might be termed normal degrees of sensitivity. It has been the writer's experience that sensitivity should, as far as possible, remain constant throughout a pickup. Performers, then become microphone conscious, and are able to adjust their audio performances to their limitations of the sound equipment.

Reflecting substances, such as glass, metals, hard woods, etc., also have an effect upon the critical area of the pickup device. Effects can be secured by placing small reflecting shields behind certain sources of sound, to give them greater intensity on the diaphragm of the condenser microphone. But this is an art as yet little understood.

What do we mean by sounds being too high or too low? The range of the human ear—the average human ear—is much wider than any recording mechanism yet made. The best recording machines will take sounds from sixteen to eighty-two hundred cycles. Under present conditions, in the writer's opinion, sounds should be confined to the band from about twenty to six thousand cycles. The bottom of the orchestra, for example, should not be lower than the tone of the A string on the contra bass. The matter of overtone scales, which give quality, will not be gone into here, as space is limited. Fair music and voice quality can be had between the frequency bands given.

Now for the fourth named limitation, that of all sounds being picked up within the critical area. Again the cinematographer is reminded of his camera. The microphone hears everything, frankly, without discrimination—if it is a good instrument.

Here is one of the factors to deal with, difficult to understand, because the human ear is so different. The human ear hears what it **wants** to hear, and leaves out what it does not want to hear. It compensates. No choice is left the user of sound equipment, then, but to eliminate sounds he does not want reproduced, all of which is very hard to do. If he builds sound-proof walls around his microphone, they will reflect, and the microphone will pick up sound on the rebound. If the walls are covered with sound absorbing materials to prevent reflection some of the frequencies will be more readily absorbed than others. If a human body moves within the critical area, or not far beyond it, as much sound will be absorbed as would escape through four and a half square feet of open window.

And finally, there must grow up on the lot sincere respect for the iron ear. It is not a toy. It is highly sensitive and rather delicate. It should be treated with reasonable consideration due to its inherent weaknesses. "Lay off mike," ought to be firmly impressed in everyone's mind.

In order best to keep sounds within the limitations of the iron ear, trained personnel is necessary, men and women who are ear-minded, who have been more or less educated through their ears.

Well educated musicians, as a rule, have these basic qualifications. But unfortunately many of them **refuse** to recognize the natural limitations of the iron ear.

It is no more ridiculous to require a camera tripod to walk from place to place than it is to expect the iron ear, the amplifier, recording machine, and reproducer, to do things they are not designed to do.

No A. B. C. of Sound This Issue

Our Technical Editor journeyed to New York to cover the S. M. P. E. Spring Meeting. As a result he has not had the time to prepare his fourth installment of his noted series of A. B. C. of Sound articles for this issue. However, the July issue will contain it, and we hope there will be no more breaks in this interesting series.—[The Editor.]

GERMANY

The German press announces the coming formation of an International Talking Picture Theater Association, which will have representative units in London, Paris, Berlin, Vienna, Warsaw, Zurich and Rome. It is stated that the necessary steps have been taken to bring about a much closer co-operation with America.

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